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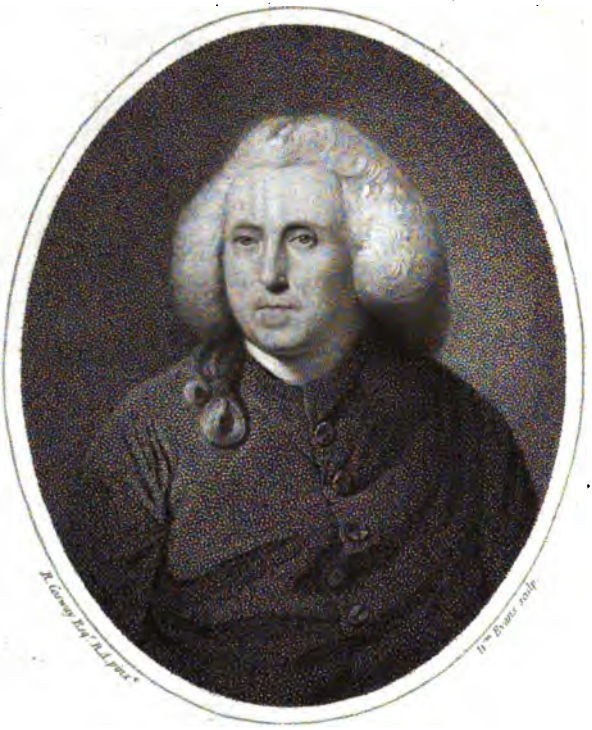

PETER TEMPLEMAN, M.D.

Principal Secretary of the Society for the Encouragement of Arts, Manufactures and Commerce.

Elected March 25. 1760.

Died September 21. 1769.

London. Published as the Act directs August 1.1789

TRANSACTIONS

OF THE

SOCIETY

INSTITUTED AT LONDON,

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES, and COMMERCE;

WITH THE

PREMIUMS offered in the YEAR 1799.

VOL. XVII.

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To be had, by MEMBERS, of the REGISTER, at the SOCIETY'S HOUSE, in the ADELPHI; and sold by Messrs. ROBSON, J. WHITE, BECKET, JOHNSON, CADELL and DAVIES, ELMSLEY and BREMNER, WALTER, RICHARDSON, DEBRETT, SEWELL, and TAYLOR.

[Price FIVE SHILLINGS.]

M.DCC.XCIX.

PREFACE.

AS a juſt and grateful tribute to the memory of their late worthy and learned Secretary, Doctor Peter Templeman, the Society have directed a Print, taken from a picture of him, painted and preſented to the Society by Richard Coſway, Eſq. R. A. to be prefixed as a Frontiſpiece to this Volume of their Tranſactions. The learning and abilities of Dr. Templeman, both as an Author and Editor, are ſo well known to the Public in general, and ſo recogniſed by thoſe of his friends who recollect him, that nothing need appear on thoſe heads; ſuffice it therefore to obſerve, that on the 25th of March, 1760, he was elected principal

Secretary to this Society, being the firſt perſon who enjoyed that title: this ſituation he held, with high reputation to himſelf, and acknowledged credit to the Society, till his death, which happened in the month of September, 1769, much to the regret of all who had the happineſs of his acquaintance, and greatly lamented by the Members of the Society, to which he had ever directed his attention, and continued a laborious and indefatigable officer.

The various articles contained in the following pages are arranged in a manner ſimilar to what has been cuſtomary for ſeveral years paſt, in the Volumes of Tranſactions annually publiſhed by this Society; but it may be proper (as has been uſually done in the Prefaces to theſe Volumes) to point out to the reader thoſe new ſubjects of Reward, which are herein-mentioned, and enumerate thoſe which, though not abſolutely new, yet, from their conſequence to the Agriculture, the Arts, and the Manufactures

tures of the Kingdom, it has been judged proper to increaſe, in hopes of ſo ſtimulating ingenious perſons, as to induce them with more ardour to ſecond the views of the Society, and thus ultimately to benefit themſelves and the Public, which are the ſole views of the Inſtitution.

To begin, therefore, with the Claſs of Agriculture, as being the firſt in the Liſt. Among the Premiums offered under this head, either new or increaſed in value, ſtands firſt, that of making Meadow Hay in wet weather, Claſs 95. It will be found in a ſubſequent Paper, inſerted in the following pages, that Clover, Lucerne, and other ſtrong-ſtalked plants, have been made into Hay, by a particular proceſs, in the Northern Counties, in wet ſeaſons; but the practice has been hitherto not attended to in the South: yet it is hoped, that what will be found in this Volume will be productive of much benefit; and no one will doubt the advantages that would univer-

ſally ariſe, could any eaſy and cheap mode be diſcovered, of preventing the ill effects that are ſo conſtantly felt from wet weather occurring during the Hay Harveſt.—Under Claſs 110, it will be ſeen, that in order to increaſe the number of perſons who may undertake to improve the Waſte Moors in this kingdom, it has been thought proper, this ſeaſon, to offer Rewards for leſs quantities of Land ſo improved than has hitherto been cuſtomary. Under the Claſſes 130 and 131, the former for deſtroying the Fly on Hops, and Caterpillars on Fruit-trees and Culinary plants, and the latter for the cure of the Rot in Sheep, it has been judged right, conſidering the great evils theſe Premiums are intended to alleviate, to increaſe the Rewards offered for attaining thoſe ends; and however it may ſeem a little foreign to the uſual practice of this Society, yet, as on the induſtry of the labouring poor, the Arts, Manufactures, and Commerce of the Country muſt in a great degree depend, the Society have this Seſſion firſt

offered

offered their Gold Medal (ſee Claſſes 135 and 136) to thoſe perſons of rank and opulence who ſhall contribute to the comfort of ſuch labouring poor, by the erection of cottages for their dwellings, and allotting a quantity of land for their accommodation.

Among the Premiums offered for Diſcoveries in Chemiſtry, one will be found (Claſs 179) for a ſubſtitute for Tar: whoever conſiders the various uſes to which this ſubſtance is applied, and how neceſſary it is, both in its liquid and ſolid ſtate (Pitch), particularly in a commercial and naval country like this, will readily acknowledge, that to prevent our being deprived of it, by war or other impediment, care ſhould be taken to find, if poſſible, among ourſelves, ſome ſubſtitute for it. It is therefore without doubt a very proper object of the Society's attention, and they have accordingly offered a very handſome Reward for the obtaining it.

The Premiums under the head of Polite Arts continue much as in the preceding Volume, except that, at Claſs 189, a Premium is now firſt offered for the beſt Baſſo Relievo in Terra Cotta, from that fruitful ſource of claſſical deſigns, the Iliad of Homer, conformably to the Will of the late John Stock, of Hampſtead, Eſq.

Two new Premiums will be found in this Volume, under the head of Mechanicks: the one for a Machine for making Bricks, Claſs 218; the other for a method of heating rooms for the purpoſes of Manufacturers, Claſs 225.

The former of theſe has occupied the attention of many ingenious perſons, but hitherto without the deſired ſucceſs; and as an effectual method of expediting and eaſing the labour of Brick-making has long been conſidered as a deſirable object in that Manufacture, the Society has now been induced thus publicly to offer a Reward

a Reward for the diſcovering a method of doing it.

The other article, Heating Rooms for the purpoſe of Manufacturers, is not only intended to prevent the accidents of fire, to which the preſent method is liable, but alſo to preſerve the health of the workmen employed, which in ſome caſes may be injured by the fumes ariſing from the Metal Tubes through which the heat, in the mode at preſent generally practiſed, paſſes; and this laſt is an object that has ever been conſidered by the Society as of very great and material importance.

The ſeveral Papers and Communications which form the moſt conſiderable part of this Volume, are herein diſpoſed as uſual, under the different Claſſes to which they belong: and firſt, in Agriculture will be found a full detail, communicated by Nathaniel Kent, Eſq. by permiſſion of His Majeſty, of the farms His Majeſty has lately

lately cauſed to be formed in the Great Park at Windſor; and, as the experiments carried on there are on a large and magnificent ſcale, there is every reaſon to believe the communication will afford much ſatisfaction, and be attended with great advantages. It is with ſome concern the Society find that no ſatisfactory account has this Seſſion been received in claim of any of the Premiums offered for raiſing Timber in this kingdom, an object of great importance at all times, but more particularly ſo at preſent, when ſome of the Northern Kingdoms have ſo encreaſed the duties on exportation as to render the various kinds of Timber, imported from thoſe countries, much higher in price than formerly. It will appear that the culture of Oſiers is making conſiderable progreſs: this is a plant which, under the preſent circumſtances, it is highly neceſſary to attend to, or a very uſeful and ingenious ſet of workmen may ſoon be deprived of employment. The culture of Beans and Wheat in regular ſucceſſion (a practice formerly only

only carried into execution in ſome few counties), but which bids fair to be attended with conſiderable advantages, will be found, by the Papers of Mr. Dudgeon, to be extending to the more diſtant parts of the kingdom, and thus one great object of the Society's attention, the communicating improvements from one part of the country to another, appears to be going on very advantageouſly. The Papers of Mr. Bell and Mr. Fox, prove that conſiderable improvements of Waſte Lands, in very diſtant parts of the kingdom, are taking place, and the manner in which the former of theſe Papers is written, cannot fail being highly ſatisfactory to the reader.

The practical obſervations made on Manures by Mr. Middleton, will throw much light, and give ſome uſeful hints reſpecting a branch of Huſbandry which, though of high importance, has hardly ever been ſufficiently attended to by Gentlemen of real ſcience and experimental knowledge; but

but it is hoped will now attract the notice of thoſe duly qualified, and be proſecuted in ſuch manner as to enable the Farmer to apply to the various Soils ſuch Manure as, with certainty, will anſwer the end propoſed by him.

The Paper by Mr. Foſter, on the comparative culture of Turneps, will afford conſiderable information concerning the cultivating that uſeful root, and ſhew the advantages which, under particular circumſtances, attend the Drill Syſtem, when applied to that plant.

The cultivation of Parſneps for the expreſs purpoſe of feeding Cattle and Sheep, is ſaid to have been long practiſed in Jerſey and Guernſey; and ſome trials by Mr. Budd were rewarded by this Society in the year 1771. The Letters now inſerted, from the Rev. Dr. De Salis, confirm all that has ever been ſaid concerning the utility of that root, for the above purpoſes, and

and ſhew the advantages ariſing from its ſuſtaining the moſt ſevere froſts of this climate; a circumſtance that cannot be too much attended to by all perſons concerned in fatting or rearing ſtock.

There is inſerted in this Volume, a Paper on the cauſe of Blight on Fruit-trees, by the author of the Diſſertations on Orcharding, printed in ſeveral of the preceding Volumes. As this is a buſineſs of very material importance, it will be highly ſatisfactory to the Society to receive any obſervations that may occur to perſons concerned in Orchards on this intereſting ſubject.

Under the Claſs of Polite Arts, in this Volume, will be found a Paper which may be conſidered as a Supplement to that inſerted in the Sixteenth Volume, on Painting in Oil, in a manner ſimilar to that practiſed in the ancient Venetian School, written by the ſame author, and containing a Proceſs

Proceſs for ſeparating the Mucilage from Linſeed Oil.

Under the ſame head is alſo inſerted a method uſed by Miſs Knights, of hardening Models in Clay, and Caſts in Plaſter, in ſuch manner as to give the former the appearance of Bronze, and the latter the reſemblance of Marble. Some artiſts have long been acquainted with the manner and advantages of hardening Caſts in Plaſter of Paris by means of Wax; but it has not hitherto been commonly practiſed in Models in Clay: although, when well performed, the effect is very beautiful, and the property of reſiſting water, ſo as to admit of waſhing them, is very deſirable, as may be found by examining the Samples remaining in the Repoſitory of the Society. A Paper will alſo be found, under the head of Polite Arts, from Mr. Nicholſon, of Ripon, in Yorkſhire, giving a full account of the method invented by him of producing Lights in Stained Drawings; the effect of which

which is highly pleaſing, as may be ſeen in a ſpecimen in the Society's Collection.

Among the Mechanical Papers inſerted in the following ſheets, is deſcribed an eaſy and expeditious method of Turning Spheres; which, in the opinion of many ingenious perſons, well informed in matters of that kind, will be highly uſeful to workmen practiſing the art of Turnery, and which is clearly exemplified by ſeveral *pieces reſerved in the Society's Collection.*

Under this head will alſo be found two plates of an Inſtrument, invented by Mr. John Hynam, of St. Peterſburg, for gauging Cutters for Wheels for Clock and Watch Makers, with the ingenious Author's Letters, and ſome Calculations on the ſubject; but the merits of the whole are more fully ſhewn in a Volume of Calculations adapted to the uſe of the Inſtrument, and preſerved in the Society's Library for public inſpection and uſe.

Under this Claſs is alſo inſerted a Plate of a new-conſtructed Clock, wherein a Crank

Crank is ſubſtituted in the place of an Eſcapement, which, in the opinion of many highly reſpectable artiſts, bids fair to be of very conſiderable uſe in the valuable art of Clock-making.

Two other plates are alſo to be found in this Volume, under the head of Mechanicks; the one, ſhewing a method of counterbalancing the Ropes in deep Shafts of Mines, &c. of which an accurate Model is reſerved; and the other, exemplifying a means made uſe of for laying Water on Water-Wheels, in an eaſy, ſteady, and advantageous manner. Of how much utility theſe two contrivances muſt be in thoſe works to which they are fitted, is too apparent to require any elucidation.

In conſequence of the Premium offered for forming Plantations of the Bread-Fruit Tree in the Weſt-India Iſlands, the Society have with pleaſure received, during this Seſſion, the Papers contained in this Volume; and, when the great advantages that will

will probably one day accrue to the inhabitants of thoſe Iſlands, from the introduction of that valuable article, are adverted to, it muſt afford high pleaſure to this Society to conſider that the firſt Reward offered for the procuring and conveying the plants to thoſe Iſlands originated in this Society, and was moſt deſervedly beſtowed on Captain Bligh in the year 1794.

Having thus given a ſummary account of the ſeveral articles contained in this Volume, there remains only to ſay, that, notwithſtanding the eſtabliſhment of ſeveral Societies on a plan ſomewhat ſimilar to this, yet ſuch is the preſent ſtate of this Inſtitution, that the ingenious of both ſexes are thus publicly invited to ſubmit their works and inventions to the inſpection of this Society, from whom they may be aſſured they will meet with every attention and encouragement their merit may entitle them to, and thereby inſure to themſelves

ſelves honour and profit in the preſent inſtance, and be authoriſed at a future period to reflect with pleaſure that their names will ſtand recorded to poſterity among thoſe worthies who have contributed to the advancement of the Arts, the Manufactures, and conſequent Commerce of their Country; from whence only can ultimately ariſe the intereſt, the riches, and the permanent glory of the Kingdom.

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Erratum in the 16th Volume of these Tranſactions.

In the Plate of Captain William Bolton's new-invented Machine for drawing Bolts in and out of Ships, the Reader is requeſted to correct a miſtake that has ariſen in a great degree from the parts being wrong lettered: for the Conductor or Steel Bar, marked in the Plate N, ſhould have been L; and the Bolt with the Male Screw (a) ſhould have been marked (N), and the large Male Screw at the other end of the Bolt omitted.

PREMIUMS

OFFERED BY THE

SOCIETY

INSTITUTED AT LONDON,

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES,

AND

COMMERCE,

IN

THE YEAR M.DCC.XCIX.

TO THE

PUBLIC.

ADELPHI-BUILDINGS,
April 10, 1799.

THE chief objects of the attention of the Society for the encouragement of Arts, Manufactures, and Commerce, in the application of their Rewards, are, ingenuity in the ſeveral branches of the POLITE and LIBERAL ARTS, uſeful Diſcoveries and Improvements in AGRICULTURE, MANUFACTURES, MECHANICKS, and CHEMISTRY, or the laying open any ſuch to the Public; and, in general, all ſuch uſeful Inventions, Diſcoveries, or Improvements (though not mentioned in the Book of Premiums), as may appear to have a tendency to the advantage of Trade and Commerce. The Society therefore, in purſuance of their plan, propoſe to beſtow the following Premiums.

Premiums for Planting and Huſbandry.

Claſs 1. ACORNS. For having ſet, between the firſt of October, 1798, and the firſt of April, 1799, the greateſt quantity of land, not leſs than ten acres, with Acorns, with or without ſeeds, cuttings, or plants of other trees, at the option of the Candidate; and for effectually fencing and preſerving the ſame, in order to raiſe timber; the GOLD MEDAL.

2. For the ſecond greateſt quantity of land, not leſs than five acres, ſet agreeably to the above conditions, the SILVER MEDAL.

CERTIFICATES of ſetting agreeably to the above conditions, and that there are not fewer than three hundred young Oaks on each acre, to be delivered to the Society on or before the firſt Tueſday in November, 1799.

3, 4. The ſame premiums are extended one year further.

CERTI-

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1800.

5, 6. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1801.

7, 8. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1802.

9. RAISING OAKS. To the perſon who ſhall have raiſed, ſince the year 1795, the greateſt number of Oaks, not fewer than five thouſand, either from young plants or acorns, in order to ſecure a ſucceſſion of oak timber in this kingdom; the GOLD MEDAL.

10. For the next greateſt number, not fewer than three thouſand, the SILVER MEDAL.

CERTIFICATES that there were on the land, at leaſt the number of young Oak-trees required, in a thriving condition, two years after the planting, with an account of the methods purſued in making and managing the plantation, to be produced to the Society on or before the firſt Tueſday in January, 1800.

11, 12. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in January, 1801.

13, 14. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in January, 1802.

15. ASCERTAINING THE BEST METHOD OF RAISING OAKS. To the perſon who ſhall aſcertain in the beſt manner, by actual experiments, the comparative merits of the different modes of raiſing Oaks for timber, either from acorns ſet on

on land properly grubbed and tilled; from acorns ſown at random among buſhes, fern, or other cover; or from young plants, previouſly raiſed in nurſeries, and tranſplanted; regard being had to the expence, growth, and other reſpective advantages of the ſeveral methods; the GOLD MEDAL.

The ACCOUNTS, and proper CERTIFICATES that not leſs than one acre has been cultivated in each mode, to be produced to the Society on or before the firſt Tueſday in November, 1799.

16. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the firſt Tueſday in November, 1800.

17. OAK TIMBER IN COMPASS FORMS. To the perſon who ſhall aſcertain, by actual experiments, the beſt method of training young Oaks, ſo as to form Compaſs Timber for Ship-building, the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES of the number of Oak-plants, not fewer than one hundred, that have been trained; and that they promiſe, in the opinion of perſons experienced in ſhip-building, to anſwer the purpoſe intended; to be delivered to the Society on or before the laſt Tueſday in December, 1805.

It is required that with the Certificates there be ſent particular accounts of the age of the trees, when they were begun to be trained, and the methods purſued in training them.

Should any perſon have already engaged in training Oaks for the above purpoſe, any information on the ſubject will be thankfully received by the Society.

18. CHESNUTS. For having ſown or ſet, between the firſt of October, 1798, and the firſt of April, 1799, the greateſt quantity of dry loamy land, not leſs than ſix acres, with Spaniſh Cheſnuts, with or without ſeeds, cuttings, or plants of other trees

trees adapted to ſuch ſoil, at the option of the Candidate; and for effectually fencing and preſerving the ſame, in order to raiſe timber; the GOLD MEDAL.

19. For the ſecond greateſt quantity, not leſs than four acres, the SILVER MEDAL.

CERTIFICATES of ſowing or ſetting agreeably to the above conditions, and that there are not fewer than three hundred Cheſnut plants, in a thriving ſtate, on each acre, to be delivered to the Society on or before the firſt Tueſday in November, 1799.

20, 21. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the firſt Tueſday in November, 1800.

22, 23. The ſame premiums are extended one year further.

CER-

CERTIFICATES to be delivered on or before the firſt Tueſday in November, 1801.

24, 25. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the firſt Tueſday in November, 1802.

26. ELM. For having planted the greateſt number of the Engliſh Elm, not leſs than eight thouſand, between the twenty-fourth of June, 1797, and the twenty-fourth of June, 1798; and for the having effectually fenced and preſerved the ſame, in order to raiſe timber; the GOLD MEDAL.

27. For the ſecond greateſt number, not leſs than five thouſand, the SILVER MEDAL.

CERTIFICATES of the having planted agreeably to the above conditions, that the plants were in a healthy and thriving ſtate

two

two years at leaſt after making the plantation, and ſpecifying the diſtance of the plants, to be delivered to the Society on or before the firſt Tueſday in April, 1800.

28, 29. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in April, 1801.

30, 31. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in April, 1802.

32, 33. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in April, 1803.

34. LARCH. For having planted out between the twenty-fourth of June, 1796, and the twenty-fourth of June, 1797, the greateſt

greateſt number of Larch-trees, not fewer than five thouſand; and for having effectually fenced and preſerved the ſame, in order to raiſe timber; the GOLD MEDAL.

35. For the next greateſt number, not fewer than three thouſand, the SILVER MEDAL.

CERTIFICATES of the number of plants, that they were in a healthy and thriving ſtate two years at leaſt after they were planted out, with a general account of the methods uſed in making the plantation, to be delivered to the Society on or before the laſt Tueſday in December, 1799.

36, 37. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1800.

38, 39. The ſame premiums are extended one year further.

CER-

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1801.

40, 41. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1802.

42, 43. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1803.

N. B. The Larch-trees may be either planted, mixed with other trees, or by themſelves, as may beſt ſuit the convenience of the planter.

44. SILVER FIR. For having planted out, between the twenty-fourth of June, 1795, and the twenty-fourth of June, 1796, in a mixed plantation of foreſt-trees, or ſeparate, according to the option of the Candidate, the greateſt number of Silver Firs,

Firs, not fewer than two thouſand; and for having effectually fenced and preſerved the ſame, in order to raiſe timber; the GOLD MEDAL.

45. For the next greateſt number, not fewer than one thouſand, the SILVER MEDAL.

CERTIFICATES of the number of plants, that they were in a healthy and thriving ſtate two years at leaſt after they were planted out, with a general account of the methods uſed in making the plantation, to be delivered to the Society on or before the laſt Tueſday in December, 1799.

46, 47. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1800.

48, 49. The ſame premiums are extended one year further.

CER-

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1801.

50. OSIERS. To the perſon who ſhall have planted, between the firſt of October, 1798, and the firſt of May, 1799, the greateſt quantity of land, not leſs than five acres, with thoſe kinds of Willows, commonly *known by the names* of Oſier, Spaniard, New-kind, or French, fit for the purpoſe of baſket-makers, not fewer than twelve thouſand plants on each acre; the GOLD MEDAL, or THIRTY GUINEAS.

51. For the ſecond greateſt quantity of land, not leſs than three acres, the SILVER MEDAL, or TEN GUINEAS.

CERTIFICATES of the planting, and that the plants were in a thriving ſtate five months at leaſt after the planting, to be produced to the Society on or before the laſt Tueſday in November, 1799.

52.

52, 53. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in November, 1800.

54. ALDER. For having planted, in the year 1796, the greateſt number of Alders, not leſs than three thouſand, the GOLD MEDAL.

CERTIFICATES of the number of plants, and that they were in a thriving ſtate two years at leaſt after being planted, to be delivered to the Society on or before the laſt Tueſday in December, 1799.

55. The ſame premium is extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in December, 1800.

56. The ſame premium is extended one year further.

CER-

CERTIFICATES to be delivered on or before the laſt Tueſday in December, 1801.

57. The ſame premium is extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in December, 1802.

58. *ASH.* For having ſown or ſet, in the year 1796, the greateſt quantity of land, not leſs than ſix acres, with Aſh for timber, with or without ſeeds, cuttings, or plants of ſuch other trees as are adapted to the ſoil; the GOLD MEDAL.

59. For the next greateſt quantity, not leſs than four acres, the SILVER MEDAL.

CERTIFICATES of the ſowing or ſetting agreeably to the above conditions; that there are not fewer than one hundred Aſh plants on each acre, in a thriving and

healthy condition, two years at leaſt after the ſowing or ſetting, with a general account of the methods uſed in making the plantation; to be delivered to the Society on or before the laſt Tueſday in December, 1799.

60, 61. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in December, 1800.

62, 63. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in December, 1801.

64, 65. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in December, 1802.

66,

66, 67. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in December, 1803.

68. TIMBER TREES. To the perſon who ſhall have encloſed, planted, or ſown, the greateſt number of acres, not leſs than ten, with the beſt ſorts of Foreſt-trees, adapted to the ſoil, for timber, between the firſt of October, 1795, and the firſt of May, 1797; the GOLD MEDAL.

An account of the methods uſed in making the plantations, and of the nature of the ſoil, together with proper CERTIFICATES that the trees were in a thriving and healthy ſtate two years at leaſt after making the plantation, to be delivered to the Society on or before the firſt Tueſday in November, 1799.

69. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the firſt Tueſday in November, 1800.

70. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the firſt Tueſday in November, 1801.

71. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the firſt Tueſday in November, 1802.

N. B. With the above Foreſt-trees, the ſeeds, cuttings, or plants, of ſuch other trees as are adapted to the ſoil, and proper for underwood, may or may not be intermixed.

72. PLANTING ORCHARDS. To the perſon who ſhall plant an Orchard after the month of Auguſt in the year 1796, in the

the moſt judicious manner, not leſs than four acres; the GOLD MEDAL, or FIFTY GUINEAS.

73. For the next in merit, the SILVER MEDAL, or THIRTY GUINEAS.

The proof of the value of the improvement of the Orchard ſhall depend on the clear product of the greateſt quantity of fine marketable fruit, to be produced during three ſucceſſive years after the year 1812, and ſold at any public market in England or Wales. Each perſon who propoſes to become a Candidate for theſe Premiums muſt ſend an account of the number of trees, their culture, pruning, and every circumſtance which can in the leaſt throw any light on the ſubject; which information will be regiſtered, with a view to form a ſyſtem of rational culture.

74. And that Gentlemen may be induced to come forward, and to make and preſerve ſuch plantations,—The perſon who can produce an ORCHARD which, at the end

of three years after planting, ſhall ſhew the greateſt promiſe of ſucceſs, ſhall be entitled to the GOLD MEDAL, or THIRTY GUINEAS.

The merits of the two firſt-mentioned Premiums being to be aſcertained by the fruit; the merit of the third Premium muſt be aſcertained by the judicious number of trees planted, the ſtraitneſs, clearneſs, and freedom of growth of the ſeveral trees; and that all the young branches run free, and at due diſtance from each other, without any galling or canker.

CERTIFICATES of the forming the Orchard, the ſoil and aſpect of the plantation, the ſale and product of the fruit for which the claims for the Premiums, Claſſes 72 and 73, are intended to be made, muſt be delivered to the Society on or before the firſt Tueſday in November, 1815; and the Certificate in claim of the Premium, Claſs 74, muſt be delivered to the Society on or before the firſt Tueſday in November, 1799.

N. B.

N. B. However expert the Orchardiſt may be in general information and attention, much will depend on ſoil, expoſure, culture, and an eaſy communication to convey the fruit to market; for every field, however valuable in other reſpects, may not be proper for an Orchard.

Any wood the Orchardiſt may chooſe to raiſe for ſhelter to ſuch plantation, is not to be *meaſured* as part of the Orchard, as the wood will more than ſupport its own expence.

75, 76, 77. The foregoing Premiums for Orchards, from Claſs 72 to Claſs 74 incluſive, are extended one year further. The claims for the Premiums, Claſs 72 and 73, to be delivered to the Society on or before the firſt Tueſday in November, 1816; and the Certificate in claim of the Premium, Claſs 74, muſt be delivered on or before the firſt Tueſday in November, 1800.

*** *The Candidates for planting all kinds of Trees are to certify, that the reſpective*

Plantations are properly fenced and ſecured, and particularly to ſtate the condition the plants were in at the time of ſigning ſuch Certificate.

Any information which the Candidates for the foregoing Premiums may chooſe to communicate, relative to the methods made uſe of in forming the Plantation, or promoting the growth of the ſeveral Trees, or any other obſervations that may have occurred on the ſubject, will be thankfully received.

78. SECURING PLANTATIONS OF TIMBER-TREES. To the perſon who ſhall give to the Society the moſt ſatisfactory Account, founded on experience, of the moſt effectual and leaſt expenſive method of ſecuring young plantations of timber-trees from Hares and Rabbits, as well as Sheep and larger cattle, which at the ſame time ſhall be leaſt ſubject to the depredations of wood-ſtealers; the SILVER MEDAL, or TWENTY GUINEAS.

The

The ACCOUNTS, and CERTIFICATES of the efficacy of the method, to be produced to the Society on or before the firſt Tueſday in November, 1799.

79. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the firſt Tueſday in *November, 1800.*

80. PREVENTING THE BLIGHT ON FRUIT-TREES. To the perſon who ſhall diſcover to the Society the beſt and moſt effectual method of preventing the Blight on Fruit-trees, ſuperior to any hitherto known or practiſed, and verified by actual and comparative experiments; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be delivered to the Society on or before the ſecond Tueſday in November, 1799.

81.

81. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the ſecond Tueſday in November, 1800.

82. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the ſecond Tueſday in November, 1801.

83. TAKING OFF THE ILL EFFECTS OF BLIGHTS. To the perſon who ſhall diſcover to the Society the beſt and moſt effectual method of taking off the ill effects of Blights on Fruit-trees, ſuperior to any hitherto known or practiſed, and verified by actual and comparative experiments; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the firſt Tueſday in February, 1800.

84.

84. COMPARATIVE CULTURE OF WHEAT. For the beſt ſet of experiments, made on not leſs than eight acres, four of which to be ſown broad-caſt, and four drilled, to aſcertain whether it is moſt advantageous to cultivate Wheat by ſowing it in the common broad-caſt way, or by drilling it in equidiſtant rows, hoeing the intervals; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

It is required that an account of the expence attending each mode of culture, with proper CERTIFICATES of the nature and condition of the land on which the experiments are made, together with an account of the produce of the Corn, be produced to the Society on or before the firſt Tueſday in February, 1800.

85. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the firſt Tueſday in February, 1801.

86.

86. COMPARATIVE CULTURE OF WHEAT. For the beſt ſet of experiments, made on not leſs than eight acres of land, four of which to be ſown broad-caſt, and four dibbled, to aſcertain whether it is moſt advantageous to cultivate Wheat by ſowing it in the common broad-caſt way, or by dibbling it in equidiſtant rows, hoeing the intervals; the GOLD MEDAL, or the SILVER MEDAL and THIRTY GUINEAS.

It is required that an account of the expence attending each mode of culture, with proper certificates of the nature and condition of the land on which the experiments are made, together with an account of the produce of the Corn, be produced to the Society on or before the firſt Tueſday in February, 1800.

87. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the firſt Tueſday in February, 1801.

88.

88. BEANS AND WHEAT. To the perſon who ſhall have planted or drilled, between the firſt of December, 1797, and the firſt of April, 1798, the greateſt quantity of land, not leſs than ten acres, with Beans, and ſhall have ſown the ſame land with Wheat in the ſame year 1798; TWENTY GUINEAS.

It is required that an account of the ſort and quantity of Beans, the time of planting or drilling, and of reaping or mowing them, the produce per acre threſhed, the application of the ſtraw, the expence of planting or drilling, hand or horſe hoeing, the diſtance of the rows, and the quality of the ſoil, together with CERTIFICATES of the number of acres, and that the land was actually ſown with Wheat in the year 1798, be produced on or before the firſt Tueſday in November, 1799.

N. B. The Society have been informed, that Beans may be drilled or planted ſo early as the month of December, from whence may

may be derived the advantage of an early harveſt; in which caſe the ſtraw will be far more valuable than that from a later planting or drilling.

89. TURNEPS. For the beſt account of experiments made on at leaſt ſix acres of land, to determine the comparative advantage of the drill or broad-caſt method in the cultivation of Turneps; the GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be delivered on or before the third Tueſday in March, 1800.

It is required that one half of the land be drilled, and the other half ſown broad-caſt.

90. VEGETABLE FOOD. For the beſt account, confirmed by experiments, of the Vegetable Food (Cabbages and Turneps excepted), growing in the months of March and April, that will moſt increaſe the milk in

in Mares, Cows, and Ewes, at that ſeaſon; provided ſuch food can be cultivated at an expence that will admit of its being applied to the above purpoſes; the GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS.

CERTIFICATES to be produced on or before the ſecond Tueſday in November, 1799.

91. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in November, 1800.

92. CULTIVATING ROOTS AND HERBAGE FOR FEEDING SHEEP AND BLACK CATTLE. For the moſt ſatisfactory experiments, made between Michaelmas, 1798, and the firſt of May, 1799, in order to aſcertain which of the following plants can be cultivated and houſed or otherwiſe

wife ſecured for winter-fodder, to the greateſt advantage, viz.

Turnep-rooted Cabbage,	Carrots,
Turnep Cabbage,	Parſneps,
Turneps,	Potatoes;

the GOLD MEDAL.

The ACCOUNTS, with proper CERTIFICATES, to be produced on or before the firſt Tueſday in November, 1799.

It is required that the above roots be taken off the land by the laſt day of October, 1798; that a crop of Wheat may be ſown in the ſame ground, and the particulars of the ſowing and planting, taking up, produce, preſerving, and application to the feeding Sheep and Black Cattle, be ſpecified. The comparative experiments muſt be made between two or more of any of the above-mentioned plants, and not leſs than one acre be cultivated with each particular kind of plant.

N. B. Great advantage will ariſe to the Farmer occupying land in the neighbourhood

hood of extenſive commons, from the conveniency of keeping large flocks of Sheep, and herds of Cattle, if the difficulty of ſupporting them through the winter was obviated by a due knowledge of this practice.

93. PARSNEPS. To the perſon who, in the year 1799, ſhall cultivate the greateſt quantity of land, not leſs than five acres, with *Parſneps*, for the ſole purpoſe of feeding Cattle or Sheep; the GOLD MEDAL, or THIRTY GUINEAS.

CERTIFICATES of the quantity of land ſo cultivated, with a particular account of the nature and quality of the ſoil and produce, and alſo of the condition of the Cattle or Sheep fed with the Parſneps, and the advantages reſulting from the practice, to be produced to the Society on or before the ſecond Tueſday in February, 1800.

94. The ſame premium is extended one year further.

The CERTIFICATES and ACCOUNTS to be produced on or before the ſecond Tueſday in February, 1801.

95. MAKING MEADOW HAY IN WET WEATHER. To the perſon who ſhall diſcover to the Society the beſt and cheapeſt method, ſuperior to any hitherto practiſed, of making Meadow Hay in Wet Weather, the GOLD MEDAL, or THIRTY GUINEAS.

A full account of the method employed, and of the expence attending the proceſs, with not leſs than fifty-ſix pounds of the Hay; and Certificates that at leaſt the produce of ſix acres of land has been made according to the method deſcribed, and that the whole is of equal quality with the ſamples; to be produced on or before the firſt Tueſday in January, 1800.

96. HARVESTING CORN IN WET WEATHER. To the perſon who ſhall

ſhall diſcover to the Society the beſt and cheapeſt method, ſuperior to any hitherto practiſed, of harveſting Corn in Wet Weather, the GOLD MEDAL, or THIRTY GUINEAS.

A full account of the method employed, and of the expence attending the proceſs, with not leſs than two Sheaves of the Corn, and Certificates that at leaſt the produce of four acres has been harveſted according to the method deſcribed, and that the whole is of equal quality with the ſamples, to be produced on or before the firſt Tueſday in January, 1800.

97. CULTIVATING THE TRUE RHUBARB. For having raiſed, before the end of the year 1799, the greateſt number of plants, not leſs than two thouſand, of Rheum Palmatum, or true Rhubarb, the GOLD MEDAL, or THIRTY GUINEAS.

CERTIFICATES of the number of plants, that they ſtand at leaſt four feet aſunder,

that they have been in a thriving ſtate during the preceding ſummer, with an account of the ſoil, culture, and aſpect, to be produced on or before the ſecond Tueſday in February, 1800.

98. The ſame premium is extended one year further.

The CERTIFICATES to be produced on or before the ſecond Tueſday in February, 1801.

99. ASCERTAINING THE COMPONENT PARTS OF ARABLE LAND. To the perſon who ſhall produce to the Society the moſt ſatisfactory ſet of experiments, to aſcertain the due proportion of the ſeveral component parts of Arable Land, in one or more Counties in Great Britain, by an accurate analyſis of it; and who, having made a like analyſis of ſome poor land, ſhall, by comparing the component parts of each, and thereby aſcertaining the deficiencies of the poor ſoil, improve a quantity

quantity of it, not leſs than one acre, by the addition of ſuch parts as the former experiments ſhall have diſcovered to be wanting therein, and therefore probably the cauſe of its ſterility; the GOLD MEDAL, or *FIFTY GUINEAS.*

It is required that the manurings, ploughings, and crops of the improved land, be the ſame after the improvement as before; *and that a minute* account of the produce in each ſtate, of the weather, and of the various influencing circumſtances, together with the method made uſe of in analyſing the ſoils, be produced, with proper CERTIFICATES, and the chemical reſults of the analyſis, which are to remain the property of the Society, on or before the laſt Tueſday in November, 1799.

It is expected that a quantity, not leſs than ſix pounds, of the rich, of the poor, and of the improved ſoils, be produced, with the Certificates.

N. B. Among the methods or proceſſes made uſe of by Chemiſts, and called DRY

or MOIST, the latter only appears adapted to the aſcertaining the reſpective proportions of the component parts of Arable earth. Dr. Shaw, in his Chemical Lectures; Dr. Home, in his Principles of Agriculture; Dr. George Fordyce, in his Elements of Agriculture; and Sir Torbern Bergman, in his "Diſſertation ſur les Terres Géoponiques;" have treated on theſe ſubjects.

100. The ſame premium is extended one year further.

The ACCOUNTS to be produced on or before the laſt Tueſday in November, 1800.

101. The ſame premium is extended one year further.

The ACCOUNTS to be produced on or before the laſt Tueſday in November, 1801.

102. IMPROVING LAND LYING WASTE. For the moſt ſatisfactory Account

count of the beſt method of improving any of the following ſoils, being land lying waſte or uncultivated, viz. Clay, Gravel, Sand, Chalk, Moor or Peat-earth and Bog; verified by experiments on not leſs than fifty acres of land; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

103. For the next greateſt quantity of land, not leſs than twenty-five acres, the *SILVER MEDAL* and TEN GUINEAS.

To be produced, with proper CERTIFICATES, on or before the ſecond Tueſday in December, 1799.

The ſoil, manner of improvement, expence, and product, together with an account of the uſes the improved land has been applied to, are required to be fully explained.

104, 105. The ſame premiums are extended one year further.

The ACCOUNTS to be produced on or before the ſecond Tueſday in December, 1800.

106, 107. The ſame premiums are extended one year further.

The ACCOUNTS to be produced on or before the ſecond Tueſday in December, 1801.

N.B. In all claims for this premium, of this or ſubſequent dates, it will be expected that the claimants produce ſome experiments of ſuch a new kind, as the Society have not granted rewards for.

108. MANURES. For the moſt ſatisfactory ſet of experiments, to aſcertain the comparative advantages of the following Manures, uſed as Top-dreſſings, on Graſs or Corn Land, viz. Soot, Coal-Aſhes, Wood-Aſhes, Lime, Gypſum, Night-ſoil, or any other fit article; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

It is required that the above experiments be made between two or more of the above-mentioned Manures, and that not leſs than

two

two acres of land be dreſſed with each Manure. An account of the nature of the ſoil, quantity and expence of the Manure, and crops, with CERTIFICATES, to be produced on or before the laſt Tueſday in February, 1800.

109. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the laſt Tueſday in February, 1801.

110. IMPROVING WASTE MOORS. For the improvement of the greateſt number of acres of Waſte Moor-Land, not leſs than one hundred, the GOLD MEDAL.

It is required that the land before improvement be abſolutely uncultivated, and in a great meaſure uſeleſs; that in its improved ſtate it be incloſed, cultivated, and divided into fields, ſufficient for the uſe and occupation of a tenant.

111.

111. For the next greateſt quantity, not leſs than fifty acres, the SILVER MEDAL, or TWENTY GUINEAS.

112. For the next greateſt quantity, not leſs than twenty-five acres, the SILVER MEDAL, or TEN GUINEAS.

CERTIFICATES of the number of acres, of the quality of the Moor ſo improved, of the mode and expence of the improvement, the ſtate it is in as to the proportion of graſs to arable, and the average value thereof, to be produced on or before the firſt Tueſday in February, 1800.

113, 114, 115. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in February, 1801.

116, 117, 118. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in February, 1802.

119, 120, 121. The ſame premiums are extended one year further.

CER-

CERTIFICATES to be produced on or before the firſt Tueſday in February, 1803.

122. GAINING LAND FROM THE SEA. To the perſon who ſhall produce to the Society an account of the beſt method, verified by actual experiment, of gaining Land from the Sea, not leſs than twenty acres, on the coaſt of Great-Britain, the GOLD MEDAL.

CERTIFICATES of the quantity of Land, and that the experiments were begun after the firſt of January, 1794, to be produced to the Society on or before the firſt Tueſday in October, 1799.

N. B. The Society have been credibly informed, that land has been gained on the coaſt of Holland, by fixing rows of whiſps of ſtraw upright in the ſand, at about a foot diſtant from each other, or by fixing ſtakes at proper diſtances from each other, and wattling ſtraw-bands between them.

123. The ſame premium is extended one year further.

CER-

CERTIFICATES to be produced on or before the firſt Tueſday in October, 1800.

124. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in October, 1801.

125. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in October, 1802.

126. MACHINE FOR DIBBLING WHEAT. To the perſon who ſhall invent the beſt Machine, to anſwer the purpoſe of Dibbling Wheat, by which the holes for receiving the grain may be made at equal diſtances and proper depths, the grain regularly delivered therein, and effectually covered; the SILVER MEDAL, or TWENTY GUINEAS.

The MACHINE, with CERTIFICATES that at leaſt three acres have been dibbled by

by it, to be produced to the Society on or before the ſecond Tueſday in January, 1800. Simplicity and cheapneſs in the conſtruction will be conſidered as principal parts of its merit.

127. MACHINE TO ANSWER THE PURPOSE OF REAPING OR MOWING CORN. For inventing a *Machine to anſwer* the purpoſe of mowing or reaping Wheat, Rye, Barley, Oats, or Beans, by which it may be done more expeditiouſly and cheaper than by any method now practiſed, provided it does not ſhed the corn or pulſe more than the methods in common practice, and that it lays the *ſtraw in* ſuch a manner as that it may be eaſily gathered up for binding; the GOLD MEDAL, or THIRTY GUINEAS.

The MACHINE, with CERTIFICATES that at leaſt three acres have been cut by it, to be produced to the Society on or before the ſecond Tueſday in December, 1799.

Simplicity

Simplicity and cheapneſs in the conſtruction will be conſidered as principal parts of its merit.

128. DESTROYING THE GRUB OF THE COCKCHAFER. To the perſon who ſhall diſcover to the Society an effectual method, verified by repeated and ſatisfactory trials, of deſtroying the Grub of the Cockchafer, or of preventing or checking the deſtructive effects which always attend Corn, Peas, Beans, and Turneps, when attacked by thoſe inſects; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be produced on or before the firſt Tueſday in January, 1800.

129. DESTROYING THE WIRE-WORM. To the perſon who ſhall diſcover to the Society an effectual method, verified by repeated and ſatisfactory trials, of deſtroying the Inſect called the Wire-Worm,

or

or of preventing or checking the deſtructive effects which always attend Corn, Beans, Peaſe, or Pulſe, when attacked by thoſe inſects; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be produced to the Society on or before the firſt Tueſday in January, 1800.

130. DESTROYING THE FLY ON HOPS, AND CATERPILLARS ON FRUIT-TREES AND CULINARY PLANTS. To the perſon who ſhall diſcover to the Society an eaſy and efficacious method of deſtroying the Fly on Hops, and Caterpillars on Fruit-trees and Culinary Plants, ſuperior to any hitherto known or practiſed, the GOLD MEDAL, or FIFTY GUINEAS.

ACCOUNTS, and CERTIFICATES that the method has been effectually practiſed, on not leſs than ſix acres of Hop-ground, or an Orchard or Garden of not leſs than

two

two acres, to be delivered to the Society on or before the firſt Tueſday in February, 1800.

131. CURE OF THE ROT IN SHEEP. To the perſon who ſhall diſcover to the Society the beſt and moſt effectual method of preventing or curing the diſeaſe called the Rot in Sheep, verified by repeated and ſatisfactory experiments, the GOLD MEDAL, or FIFTY GUINEAS.

It is expected that the Candidates furniſh accurate accounts of the nature, ſymptoms, and cure of the diſeaſe, together with the imputed cauſe thereof, and the actual or probable means of prevention, which, with proper CERTIFICATES, muſt be delivered to the Society on or before the firſt Tueſday in February, 1800.

132. PREVENTING AND CURING THE ILL EFFCTS OF THE FLY ON SHEEP. To the perſon who ſhall diſcover

diſcover to the Society the moſt effectual method of preventing and curing the ill effects of the Fly on Sheep, the SILVER MEDAL, or TWENTY GUINEAS.

It is required that the method be aſcertained by repeated experiments, and that a CERTIFICATE of its efficacy be delivered to the Society on or before the firſt Tueſday in December, 1799.

133. PROTECTING SHEEP. To the perſon who, in the year 1799, ſhall protect the greateſt number of Sheep, not fewer than five hundred, in bad ſeaſons, by houſing them in hovels or ſheds; and give the moſt ſatisfactory account, verified by experiment, of the advantages ariſing from the practice of defending Sheep from the inclemency of the weather, by ſuch hovels or ſheds; TWENTY GUINEAS.

A particular account of the experiments made, with the advantages ariſing therefrom, together with the expence, and CERTIFI-

CATES of its utility, to be produced to the Society on or before the firſt Tueſday in March, 1800.

134. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the firſt Tueſday in March, 1801.

N. B. It is at the option of the Candidates to have their hovels fixed, or moveable; and it is required, that the CERTIFICATES ſhall ſpecify the length of time the Sheep were under cover, and the manner in which they were maintained during that time; together with the general method of managing them in the ſaid hovels.

135. IMPROVING THE CONDITION OF THE LABOURING POOR, BY ERECTING COTTAGES, AND APPORTIONING LAND. To the perſon who, in the year 1799, ſhall erect the greateſt number of Cottages for the accommodation

commodation of the Labouring Poor, and apportioning not leſs than two acres of Land to each Cottage; the GOLD MEDAL.

136. IMPROVING THE CONDITION OF THE LABOURING POOR, BY APPORTIONING LAND TO COTTAGES. To the perſon who, in the year 1799, ſhall apportion to the greateſt number of Cottages already built upon his *or her eſtate, any* quantity of Land, not leſs than two acres to each Cottage, for the better accommodation of the reſpective inhabitants; the GOLD MEDAL.

The ACCOUNTS of the number of Cottages erected, and of the quantity of Land apportioned to each, to be delivered to the Society, with proper CERTIFICATES, on or before the firſt Tueſday in February, 1800.

137, 138. The ſame premiums are extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the firſt Tueſday in February, 1801.

139, 140. The ſame premiums are extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the firſt Tueſday in February, 1802.

Premiums

Premiums for Diſcoveries and Improvements in Chemiſtry, Dying, and Mineralogy.

141. BARILLA. For the greateſt quantity of Merchantable Barilla, not leſs than *half* a ton, made from Spaniſh Kali, or any other plant raiſed in Great Britain; the GOLD MEDAL, or THIRTY GUINEAS.

A ſample, of not leſs than twenty-eight pounds, with a CERTIFICATE that half a ton has been made, to be produced on or before the firſt Tueſday in January, 1800.

142. PRESERVING SEEDS OF VEGETABLES. For the beſt method of preſerving the ſeeds of Plants, in a ſtate fit for vegetation, a longer time than has hitherto been practiſed, ſuch method being ſuperior to any known to the public, and verified by ſufficient trial; to be communicated to the Society on or before the firſt Tueſday in December, 1799; the GOLD MEDAL, or THIRTY GUINEAS.

143. The ſame premium is extended one year further; the ACCOUNTS to be produced on or before the firſt Tueſday in December, 1800.

144. METHOD OF SEPARATING THE SACCHARINE SUBSTANCE OF TREACLE IN A SOLID FORM. To the perſon who ſhall diſcover to the Society the beſt method of ſeparating the Saccharine Subſtance of Treacle in a ſolid form, at ſuch an expence as will render it advantageous to the public; the GOLD MEDAL, or FIFTY GUINEAS.

A quantity of the Saccharine Subſtance, ſo ſeparated, in a ſolid form, not leſs than thirty pounds weight, with an account of the proceſs, and CERTIFICATES that not leſs than one hundred weight has been prepared, to be produced to the Society on or before the firſt Tueſday in February, 1800.

145. PRESERVING FRESH-WATER SWEET. To the perſon who ſhall produce

produce to the Society the beſt account, verified by ſatisfactory trials, of an efficacious method of preſerving Freſh-water ſweet during long voyages; the GOLD MEDAL, or FIFTY GUINEAS.

ACCOUNTS, and full deſcriptions of the methods made uſe of, in order that it may be known that nothing injurious enters therein, to be produced to the Society, with at *leaſt thirty* gallons of Water ſo preſerved, and proper CERTIFICATES, on or before the laſt Tueſday in December, 1799.

146. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the laſt Tueſday in December, 1800.

147. PURIFYING BRACKISH WATER. To the perſon who ſhall diſcover to the Society the beſt and cheapeſt method, verified by actual experiment, of Purifying or reducing Brackiſh Water, which fre-

quently ariſes from New Wells, made in particular places, to a natural ſweetneſs, fit for the uſe of families and for the purpoſe of cattle; the SILVER MEDAL, or FIFTEEN GUINEAS.

Satisfactory CERTIFICATES that ſuch Brackiſh Water has been rendered perfectly ſweet, and uſed by the family to which ſuch Well may belong at leaſt three months afterwards, with an account of the method made uſe of in purifying the ſame, to be delivered to the Society on or before the ſecond Tueſday in February, 1800.

148. DESTROYING SMOKE. For the beſt account, aſcertained by proper experiments, of a cheap method of deſtroying or burning the Smoke of Fires belonging to Steam-Engines, Furnaces employed in calcining or ſmelting Metals, or other large works, in order to prevent annoyance to the neighbourhood; to be produced on or before the firſt Tueſday in January, 1800; the GOLD MEDAL, or THIRTY GUINEAS.

149.

149. The ſame premium is extended one year further.

The ACCOUNTS to be produced on or before the firſt Tueſday in January, 1801.

150. CONDENSING SMOKE. To the perſon who ſhall invent the beſt method by which the Smoke of Steam-Engines, Brewhouſes, Sugar-houſes, or Furnaces, may be advantageouſly condenſed and collected in the form of Tar, or ſome other uſeful material; the GOLD MEDAL, or FIFTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES of the method having been ſucceſsfully employed, and ſpecimens of the materials produced, to be delivered to the Society on or before the firſt Tueſday in December, 1799.

151. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the firſt Tueſday in December, 1800.

152.

152. CANDLES FROM RESIN OR OTHER SUBSTANCE. To the perſon who ſhall diſcover to the Society the beſt method of making Candles of Reſin, or any other ſubſtance, fit for common uſe, at a price much inferior to thoſe made of Tallow only; the GOLD MEDAL, or THIRTY GUINEAS.

Six pounds at leaſt of the Candles ſo prepared, with an ACCOUNT of the proceſs, to be delivered to the Society on or before the firſt Tueſday in December, 1799.

153. REFINING WHALE OR SEAL OIL. For diſcloſing to the Society an effectual method of purifying Whale or Seal Oil from the glutinous matter that encruſts the wicks of lamps and extinguiſhes the light, though fully ſupplied with oil; the GOLD MEDAL, or FIFTY GUINEAS.

It is required that the whole of the proceſs be fully and fairly diſcloſed, in order that ſatisfactory experiments may be made by the Society to determine the validity of the

the claim; and CERTIFICATES that not leſs than twenty gallons have been purified according to the proceſs delivered in, together with two gallons of the oil, in its unpurified ſtate, and two gallons ſo refined, be produced to the Society on or before the ſecond Tueſday in February, 1800.

154. The ſame premium is extended one year *further.*

CERTIFICATES and SAMPLES to be produced on or before the ſecond Tueſday in February, 1801.

155. CLEARING FEATHERS FROM THEIR ANIMAL OIL. To the perſon who ſhall diſcover to the Society the beſt and moſt expeditious method, ſuperior to any hitherto practiſed, of clearing Gooſe-feathers from their offenſive Animal Oil, for the uſe of Upholders, in making beds, cuſhions, &c. the GOLD MEDAL, or FORTY GUINEAS.

A quantity of ſuch Feathers, unſtripped, and ſo cleared, not leſs than forty pounds weight,

weight, with a full account of the proceſs, to be produced to the Society on or before the firſt Tueſday in February, 1800.

156. SUBSTITUTE FOR, OR PREPARATION OF, YEAST. For diſcovering to the Society an effectual Subſtitute for Yeaſt, or preparation of Yeaſt, which, after being kept ſix months, ſhall be fit for fermenting liquors, and raiſing bread; the GOLD MEDAL, or THIRTY GUINEAS.

Specimens of the Subſtitute, or of the Preparation of Yeaſt, ſufficient for trials, together with a paper ſealed up, and containing an account of the compoſition of the Subſtitute, or method of preparing the Yeaſt, to be produced on or before the laſt Tueſday in November, 1799.

157. PROOF SPIRIT. To the Diſtiller who in the year 1799 ſhall make the greateſt quantity, not leſs than one hundred gallons, of a clean marketable Spirit, from articles

articles not the food of man or cattle, equal in ſtrength or quality to the Proof Spirit now in uſe, and at a rate not higher than the ſpirit produced from corn or melaſſes; the GOLD MEDAL, or FIFTY GUINEAS.

Ten gallons of the Spirit, together with proper CERTIFICATES, and a full account of the expence and mode of making it, to be produced to the Society on or before the firſt Tueſday in January, 1800.

158. PRESERVING SALTED PROVISIONS FROM BECOMING RANCID OR RUSTY. To the perſon who ſhall diſcover to the Society the beſt, cheapeſt, and moſt efficacious method of preſerving Salted Proviſions from growing rancid or ruſty; the GOLD MEDAL, or THIRTY GUINEAS.

A full deſcription of the method, with proper CERTIFICATES that it has been found, on repeated trials, to anſwer the purpoſe intended, to be produced to the Society on or before the firſt Tueſday in February, 1800.

159. The

159. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced to the Society on or before the firſt Tueſday in February, 1801.

160. INCREASING STEAM. To the perſon who ſhall diſcover to the Society a method, verified by actual experiments, of increaſing the quantity or the force of Steam, in Steam-Engines, with leſs fuel than is uſually employed, provided that in general the whole amount of the expences, in uſing Steam-Engines, may be conſiderably leſſened; the GOLD MEDAL, or THIRTY GUINEAS.

To be communicated to the Society on or before the firſt Tueſday in January, 1800.

N. B. As it is well known there are methods of preventing the ebullition of liquids by the addition of particular matters in the boiling, it is ſubmitted to the conſideration of the ingenious, whether, by the addition

addition of ſome matters, or by ſome mechanical operations, the boiling and evaporation may not be increaſed.

161. PREVENTING THE DRY-ROT IN TIMBER. To the perſon who ſhall diſcover to the Society the cauſe of the Dry-Rot in Timber, and diſcloſe a certain method of prevention, ſuperior to any hitherto known; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS of the cauſe, and method of prevention, confirmed by repeated experiments, to be produced to the Society on before the ſecond Tueſday in December, 1799.

162. The ſame premium is extended one year further.

The ACCOUNTS to be produced on or before the ſecond Tueſday in December, 1800.

163. FINE BAR-IRON. To the perſon, in Great Britain, who ſhall make the

the greateſt quantity of Bar-Iron, not leſs than ten tons, with Coak, from Coak Pigs, equal in quality to the beſt Iron imported from Sweden or Ruſſia, and as fit for converting into Steel; the GOLD MEDAL.

SAMPLES, not leſs than one hundred weight, with CERTIFICATES that the whole quantity is of equal quality, to be produced to the Society on or before the firſt Tueſday in January, 1800.

164. METHOD OF PREPARING WHITE LEAD, WHICH SHALL NOT BE PREJUDICIAL. To the perſon who ſhall diſcover to the Society a method of preparing White Lead, in a manner that ſhall not be prejudicial to the health of the Workmen employed either in making or uſing it, and will anſwer all the purpoſes for which White Lead is at preſent uſed; the GOLD MEDAL, or FIFTY GUINEAS.

A quantity of the White Lead ſo prepared, with an account of the proceſs made uſe of,

of, and CERTIFICATES that not leſs than one ton has been manufactured in the ſame manner, to be produced to the Society on or before the ſecond Tueſday in February, 1800.

165. SUBSTITUTE FOR THE BASIS OF PAINT. To the perſon who ſhall produce to the Society the beſt Subſtitute, ſuperior to any hitherto known, for the *Baſis of Paint*, equally proper for the purpoſe as the White Lead now employed; ſuch ſubſtitute not to be of a noxious quality, and which may be afforded at a price not materially higher than that of White Lead; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

A quantity of the Subſtitute, not leſs than fifty pounds weight, with an ACCOUNT of the proceſs uſed in preparing it, and CERTIFICATES that at leaſt one hundred weight has been manufactured, to be produced to the Society on or before the ſecond Tueſday in November, 1799.

166. The ſame premium is extended one year further.

CERTIFICATES and ACCOUNTS to be produced on or before the ſecond Tueſday in November, 1800.

167. RED PIGMENT. To the perſon who ſhall diſcover to the Society a full and ſatisfactory proceſs for preparing a red Pigment, fit for uſe, in oil or water, equal in tone and brilliancy to the beſt Carmines and Lakes now known or in uſe, and perfectly durable; the GOLD MEDAL, or THIRTY GUINEAS.

One pound weight of ſuch Colour, and a full diſcloſure of its preparation, to be produced to the Society on or before the firſt Tueſday in February, 1800.

N. B. It is not required that the Colour ſo to be produced ſhould reſiſt the action of fire or chemical applications, but remain unaltered by the common expoſure to ſtrong light, damps, and noiſome vapours.

168.

168. REFINING BLOCK TIN. To the perſon who ſhall diſcover to the Society the beſt method of purifying or refining *Block Tin*, in ſuch a manner as to render it fit for the finer purpoſes to which *Grain Tin* is now ſolely applied, and at an expence that ſhall not render it higher in price than *Grain Tin*; the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES that not leſs than three tons have been refined or purified, with a full detail of the proceſs, and a quantity, not leſs than one hundred weight, of the Tin ſo refined, to be produced to the Society on or before the firſt Tueſday in November, 1799.

169. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1800.

170. GLAZING EARTHEN WARE WITHOUT LEAD. To the perſon who

ſhall diſcover to the Society the cheapeſt, ſafeſt, moſt durable, and moſt eaſily fuſible Compoſition, fit for the purpoſe of glazing the ordinary kinds of Earthen Ware, without any preparation of Lead, and equal to any hitherto in uſe; the GOLD MEDAL, or THIRTY GUINEAS.

SPECIMENS of the Ware ſo glazed, with proper CERTIFICATES of its having ſucceeded, and a SAMPLE of the materials made uſe of, to be produced to the Society on or before the firſt Tueſday in February, 1800.

171. BLACK DYE ON COTTON. To the perſon who ſhall invent and produce to the Society a Black Dye on Cotton Yarn, ſuperior to any hitherto known or in uſe; the GOLD MEDAL, or THIRTY GUINEAS.

A full ACCOUNT of the proceſs, with CERTIFICATES that the Cotton thus dyed ſtands waſhing with ſoap, and a SAMPLE of the Yarn ſo dyed, not leſs than five pounds weight, to be produced to the Society on

or

or before the firſt Tueſday in February, 1800.

172. PRESERVING IRON FROM RUST. To the perſon who ſhall invent and diſcover to the Society, a cheap Compoſition, which ſhall effectually preſerve Wrought Iron from Ruſt, the GOLD MEDAL, or FIFTY GUINEAS.

A *full* deſcription of the method of preparing the Compoſition, with CERTIFICATES that it has ſtood at leaſt two years unimpaired, and expoſed to the atmoſphere during the whole time, to be produced to the Society, with ten pounds weight of the compoſition, on or before the firſt Tueſday in January, 1800.

173. The ſame premium is extended one year further.

The deſcription and CERTIFICATES to be produced to the Society on or before the firſt Tueſday in January, 1801.

174. The ſame premium is extended one year further.

The deſcription and CERTIFICATES to be produced to the Society on or before the laſt Tueſday in January, 1802.

175. OPIUM. To the perſon who, in the year 1799, ſhall prepare the greateſt quantity, not leſs than twenty pounds weight, of Opium, from Poppies grown in Great Britain, and equal in quality to the beſt foreign Opium; the GOLD MEDAL, or FIFTY GUINEAS.

176. For the next greateſt quantity, not leſs than ten pounds weight, the SILVER MEDAL, or TWENTY GUINEAS.

SAMPLES of the Opium, not leſs than five pounds weight, with proper CERTIFICATES that the whole is of the ſame quality, to be produced to the Society, with a particular account of the method of cultivating the Poppies, and preparing the Opium, on or before the laſt Tueſday in February, 1800.

177,

177, 178. The ſame premiums are extended one year further.

The SAMPLES, CERTIFICATES, and ACCOUNTS, to be produced to the Society on or before the laſt Tueſday in February, 1801.

179. SUBSTITUTE FOR TAR. To the perſon who ſhall invent and diſcover to the Society the beſt Subſtitute for Vegetable Tar, equal in all its properties to the beſt Stockholm Tar, and prepared from materials the produce of Great-Britain; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

A quantity of the Subſtitute, not leſs than one hundred weight, with CERTIFICATES that at leaſt one ton has been manufactured, and that it can be afforded at a price not exceeding that of the beſt foreign Tar, together with an Account of the proceſs, to be delivered to the Society on or before the firſt Tueſday in March, 1800.

180. The ſame premium is extended one year further.

The SAMPLES, CERTIFICATES, and ACCOUNTS, to be delivered to the Society on or before the firſt Tueſday in March, 1801.

Premiums

Premiums for promoting the Polite Arts.

181. HONORARY PREMIUMS FOR DRAWINGS. For the beſt Drawing of any kind, made with Water-Colours, Crayons, Chalk, Black Lead, Pen, Indian Ink, or Biſter, by young Gentlemen under the age of twenty-one, ſons or grandſons of Peers, or Peereſſes in their own right, of Great *Britain* or Ireland, to be produced on or before the firſt Tueſday in March, 1800, the HONORARY MEDAL of the Society IN GOLD.

182. The ſame IN SILVER for the next in merit.

183, 184. The ſame premiums will be given, on the like conditions, to young Ladies, daughters or grand-daughters of Peers, or Peereſſes in their own right, of Great Britain or Ireland.

185. HONORARY PREMIUMS FOR DRAWINGS. For the beſt Drawing

ing of any kind, made with Water-colours, Crayons, Chalk, Black Lead, Pen, Indian Ink, or Biſter, by young Gentlemen under the age of twenty-one; to be produced on or before the firſt Tueſday in March, 1800; the GOLD MEDAL.

180. For the next in merit, the SILVER MEDAL.

187, 188. The ſame premiums will be given for Drawings by young Ladies.

N. B. As the foregoing Honorary Premiums are intended only for ſuch of the Nobility and Gentry as may hereafter become patrons or patroneſſes of the Arts; perſons profeſſing any branch of the Polite Arts, or any buſineſs dependent on the Arts of Deſign, or the ſons or daughters of ſuch perſons, will not be admitted Candidates in theſe Claſſes.

The following Premium (Claſs 189) is offered in conformity to the Will of the late John Stock, of Hampſtead, Eſq.

189. SCULPTURE. For the beſt Baſſo-relievo in Terra Cotta, the ſubject taken from the Iliad of Homer, and conſiſting of not fewer than three human figures, the height of the principal figure not *leſs than* twelve inches, to be produced on or before the third Tueſday in February, 1800, a SILVER MEDALLION, with the following engraved inſcription: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampſtead, Eſq.*

The Baſſo-relievo to which the premium is adjudged to remain the property of the Society.

190. DRAWINGS OF OUTLINES. For the beſt Outline, after an original group

or

or caſt, in plaſter, of Human Figures, by perſons of either ſex, under the age of ſixteen, the principal figure not leſs than twelve inches; to be produced on or before the third Tueſday in February, 1800; the greater SILVER PALLET.

191. For the next in merit, the leſſer SILVER PALLET.

N. B. Theſe Drawings are to be made on Paper; and the original either to be produced to the Society, or to be referred to for their examination.

192. DRAWINGS OF LANDSCAPES. For the beſt Drawing of a Landſcape after nature, by perſons of either ſex, under twenty-one years of age, to be produced on or before the third Tueſday in February, 1800, the greater SILVER PALLET.

193. For the next in merit, the leſſer SILVER PALLET.

Each

Each Candidate muſt mention, on the front of the Drawing, from whence the View was taken; and the Drawings muſt be made with Chalk, Pen, Indian Ink, Water-Colours, or Biſter.

194. HISTORICAL DRAWINGS. For the beſt Hiſtorical Drawing, being an original compoſition, of five or more Human Figures; the height of the principal figure not leſs than eight inches; to be made with Crayons, Chalk, Black Lead, Pen, Indian Ink, Water-Colours, or Biſter, and to be produced on or before the third Tueſday in February, 1800; the GOLD PALLET.

195. For the next in merit, the greater SILVER PALLET.

196. SURVEYS OF COUNTIES. To the perſon who, in the year 1799, ſhall complete and publiſh an accurate Survey of any one County in England or Wales, on a ſcale of not leſs than one inch to a mile, for which

which rewards have not already been given by the Society; the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES of the accuracy of the Survey, and that it was begun after the firſt of June, 1795, together with the Map, to be produced on or before the laſt Tueſday in January, 1800.

The Map to which the premium ſhall be adjudged, to remain the property of the Society.

N. B. The Society are already in poſſeſſion of Surveys of the following Counties, viz. Bedford, Cheſhire, Cornwall, Cumberland, Derbyſhire, Devonſhire, Dorſetſhire, Durham, Hampſhire, Herefordſhire, Hertfordſhire, Huntingdonſhire, Lancaſhire, Leiceſterſhire, Northamptonſhire, North Wales (large and ſmall), Nottinghamſhire, Oxfordſhire, Somerſetſhire, Staffordſhire, Suffolk, Surrey, Suſſex, Weſtmoreland, and Worceſterſhire.

179. The ſame premium is extended one year further.

The

The Survey to be begun after the firſt of June, 1796; and the Map to be produced on or before the laſt Tueſday in January, 1801.

198. The ſame premium is extended one year further.

The Survey to be begun after the firſt of June, 1797; and the Map to be produced on or before the laſt Tueſday in January, 1802.

199. NATURAL HISTORY. To the Author who ſhall publiſh, in the year 1799, the Natural Hiſtory of any County of England or Wales, the GOLD MEDAL, or FIFTY GUINEAS.

It is required that the ſeveral natural productions, whether animal, vegetable or mineral, peculiar to the County, or found therein, be carefully and ſpecifically arranged and deſcribed, in order that the Public may be enabled to judge what Arts

or

or Manufactures are moſt likely to ſucceed in ſuch County.

The Work to be delivered to the Society on or before the laſt Tueſday in January, 1800.

200. The ſame premium is extended one year further.

The Work to be delivered to the Society on or before the laſt Tueſday in January, 1801.

201. The ſame premium is extended one year further.

The Work to be delivered to the Society on or before the firſt Tueſday in January, 1802.

CONDITIONS.

No perſon who has gained the firſt premium in any Claſs, will be admitted a Candidate in a claſs of an inferior age; and no Candidate

Candidate ſhall receive more than one Premium in one year; nor will they who for two ſucceſſive years ſhall gain the firſt Premium in one Claſs, be ever again admitted as Candidates in that Claſs.

No perſon ſhall ever be admitted a Candidate in any Claſs, in which he has three times obtained the whole of the firſt Premium.

No Candidate ſhall ſend in more than one Performance in any one Claſs.

All the Claims which are produced each Seſſion before the Committee of Polite Arts (to which Premiums or Bounties are adjudged), are to remain with the Society till after the public diſtribution of Rewards in May.

No Claim for a Premium in the Polite Arts will be admitted, that has obtained, or has been produced in order to obtain, a Premium, Reward, or Gratification, from any other Society, or any Academy or School.

All Performances that obtain Premiums in the Polite Arts, muſt be begun after the publication of ſuch Premiums.

Purpoſely to encourage real merit, and to prevent any attempts to impoſe on the Society, by producing drawings which ſhall have been made or retouched by any other perſon than the Candidate, the Society is reſolved, upon all occaſions, with reſpect to the ſucceſsful Candidates in Claſſes 190 to 194 incluſive, to prove their abilities, by requiring a ſpecimen made under the inſpection of the Committee of Polite Arts, in every inſtance where ſuch proof can be obtained.

It is required that all Candidates in the Polite Arts do ſignify, on their drawings, their age; and whether the performances are originals, or copies; and, if copies, whence they were taken.

Premiums

Premiums for encouraging and improving Manufactures.

202. SILK. For the greateſt quantity of merchantable Silk, not leſs that ten pounds weight, produced by worms bred in England in the year 1799, the property of any one perſon; the GOLD MEDAL.

203. For the ſecond greateſt quantity, not leſs than five pounds weight; the SILVER MEDAL.

SPECIMENS of the SILK, not leſs than one pound, with CERTIFICATES that the whole is of equal quality, and produced in England, to be delivered to the Society on or before the firſt Tueſday in January, 1800.

204. MACHINE FOR CARDING SILK. For the beſt Machine, ſuperior to any now in uſe, for carding Waſte Silk equally well as by hand; to be produced, together with a ſpecimen of the Cardings,

on or before the firſt Tueſday in November, 1799; the GOLD MEDAL, or THIRTY GUINEAS.

205. CLOTH FROM HOP-STALKS OR BINES. To the perſon who ſhall produce to the Society the greateſt quantity, not leſs than thirty yards, of Cloth, at leaſt twenty-ſeven inches wide, made in Great Britain, of Hop-Stalks or Bines, and ſuperior to any hitherto manufactured in England of that material; the GOLD MEDAL, or THIRTY GUINEAS.

One pound of the Thread of which the Cloth is made, and thirty yards of the Cloth, together with proper CERTIFICATES that the whole is manufactured from Hop-Stalks or Bines, to be produced to the Society on or before the firſt Tueſday in December, 1799.

N. B. The Society are already in poſſeſſion of Cloth made in England from Hop-Stalks or Bines, which may be inſpected by application to the Regiſter.

206.

206. WICKS FOR CANDLES OR LAMPS. To the perſon who ſhall diſcover to the Society a method of manufacturing Hop-Stalks or Bines, or any other cheap material, the growth of Great Britain, ſo as to render them fit for the purpoſe of ſupplying the place of Cotton, for Wicks of Candles or Lamps; TWENTY GUINEAS.

SAMPLES, not leſs than five pounds weight, of the Wicks, ſo prepared, to be produced to the Society, with CERTIFICATES that the whole quantity is equal in quality to the Sample, on or before the ſecond Tueſday in January, 1809.

207. The ſame premium is extended one year further.

SAMPLES and CERTIFICATES to be produced on or before the ſecond Tueſday in January, 1801.

208. PAPER FROM RAW VEGETABLE SUBSTANCES. To the perſon

in Great Britain who ſhall make the greateſt quantity, not leſs than ten reams, of the beſt and moſt uſeful Paper, from Raw Vegetable Subſtances; TWENTY GUINEAS.

CERTIFICATES of the making ſuch Paper, and one ream of the Paper, to be produced on or before the firſt Tueſday in November, 1799.

N. B. The Society are in poſſeſſion of two volumes, containing a great variety of ſpecimens of Paper made from Raw Vegetables, viz. Thiſtles, Potatoe-Haum, Poplar, Hop-bines, &c. which volumes may be inſpected by any perſon, on application to the Regiſter.

209. TAKING PORPOISES. To the people in any boat or veſſel, who, in the year 1799, ſhall take the greateſt number of Porpoiſes, on the coaſt of Great Britain, by Gun-Harpoon, or any other method, not fewer than thirty, for the purpoſe of extracting oil from them; THIRTY POUNDS.

CERTI-

CERTIFICATES of the number, ſigned by the perſons to whom they have been ſold or delivered for the purpoſe of extracting the oil, to be produced to the Society on or before the laſt Tueſday in January, 1800.

210. OIL FROM PORPOISES. To the perſon who ſhall manufacture the greateſt quantity of Oil from Porpoiſes taken on the coaſt of Great Britain, in the year 1799, not leſs than thirty tons; THIRTY POUNDS.

211. For the next greateſt quantity, not leſs than fifteen tons, FIFTEEN POUNDS.

CERTIFICATES of the Oil having been made from Porpoiſes actually caught on the coaſt of Great Britain, and two gallons of the Oil, as a Sample, to be produced to the Society on or before the laſt Tueſday in February, 1800.

Premiums for Inventions in Mechanicks.

212. TRANSIT INSTRUMENT. To the perſon who ſhall invent and produce to the Society a cheap and portable Tranſit Inſtrument, which may eaſily be converted into a Zenith Sector, capable of being accurately and expeditiouſly adjuſted for the purpoſe of finding the Latitudes and Longitudes of places, and ſuperior to any portable Tranſit Inſtrument now in uſe; the GOLD MEDAL, or FORTY GUINEAS.

To be produced on or before the laſt Tueſday in January, 1800.

213. TAKING WHALES BY THE GUN-HARPOON. To the perſon who, in the year 1799, ſhall ſtrike the greateſt number of Whales, not fewer than three, with the Gun-Harpoon; TEN GUINEAS.

Proper CERTIFICATES of the ſtriking ſuch Whales, and that they were actually taken

taken in the year 1799, ſigned by the Maſter, or by the Mate when the Claim is made by the Maſter, to be produced to the Society on or before the laſt Tueſday in December, 1799.

214. DRIVING BOLTS INTO SHIPS. To the perſon who ſhall invent and produce to the Society a Model, ſhewing a method of driving Bolts into Ships, particularly thoſe of Copper, without ſplitting the head or bending them, with more diſpatch, in all directions, and tighter than by any means hitherto known or in uſe; the GOLD MEDAL, or FORTY GUINEAS.

The Model, with CERTIFICATES that a Machine on the ſame conſtruction has been uſed to advantage, to be produced to the Society on or before the firſt Tueſday in February, 1800.

215. PARISH OR FAMILY MILL. To the perſon who ſhall invent and produce to the Society, the beſt-conſtructed Mill for grinding

grinding corn for the uſe of private families, or pariſh poor; the conſtruction to be ſuch as to render the working of the Mill eaſy and expeditious, and ſuperior to any hitherto in uſe; the GOLD MEDAL, or FORTY GUINEAS.

The Mill, and CERTIFICATES of its having been uſed to good effect, to be produced to the Society on or before the firſt Tueſday in February, 1800.

N. B. Cheapneſs and ſimplicity will be conſidered as eſſential parts of its merit.

216. MACHINE FOR RAISING COALS, ORE, &c. &c. To the perſon who ſhall invent a Machine for raiſing Coals, Ore, &c. from Mines, which ſhall produce the effect at a leſs expence than thoſe already known or in uſe; the GOLD MEDAL, or FIFTY GUINEAS.

A Model of the Machine, made on a ſcale of not leſs than one inch to a foot, with a CERTIFICATE that a Machine at large

large on the ſame conſtruction has been advantageouſly uſed, to be produced to the Society on or before the ſecond Tueſday in February, 1800.

217. MACHINE FOR RAISING WATER. To the perſon who ſhall invent a Machine, on a better, cheaper, and more ſimple conſtruction than any hitherto known or in uſe, for raiſing Water out of Wells, &c. from a depth not leſs than fifty feet; the GOLD MEDAL, or FORTY GUINEAS.

CERTIFICATES of the performance of the Machine, and a Model of it, on a ſcale of not leſs than one inch to a foot, to be produced to the Society on or before the firſt Tueſday in February, 1800.

218. MACHINE FOR MAKING BRICKS. To the perſon who ſhall invent the beſt and cheapeſt Machine for making Bricks, ſuperior to any hitherto known or in uſe, whereby the labour and expence of making

making Bricks in the uſual mode, by hand, may be greatly diminiſhed; FORTY GUINEAS.

A Model, with CERTIFICATES that a Machine at large, on the ſame conſtruction, has been uſed to good effect for the purpoſe of making Bricks, and that at leaſt one hundred thouſand Statute Bricks have been made therewith, to be produced to the Society on or before the firſt Tueſday in March, 1800.

219. BORING ROCKS IN ORDER TO BLAST THEM. To the perſon who ſhall diſcover to the Society a more cheap, ſimple, and expeditious Method than any hitherto known or in uſe, of Boring Rocks in Mines, Shafts, Wells, &c. for the purpoſe of Blaſting them with Gunpowder; the GOLD MEDAL, or FORTY GUINEAS.

CERTIFICATES of the Method having been practiſed with ſucceſs, with a full deſcription thereof, to be delivered to the Society

Society on or before the firſt Tueſday in January, 1800.

220. PREVENTING PASSENGERS IN CARRIAGES BEING INJURED WHEN THE HORSES HAVE TAKEN FRIGHT. To the perſon who ſhall invent and diſcover to the Society the beſt and moſt effectual method of preventing Paſſengers in Carriages being injured when the Horſes have taken *fright*; the GOLD MEDAL, or THIRTY GUINEAS.

CERTIFICATES that the Invention has been uſefully applied to at leaſt one Carriage, and may be advantageouſly applied to others, to be produced to the Society on or before the ſecond Tueſday in February, 1800.

221. GUNPOWDER MILLS. To the perſon who, in the year 1799, ſhall invent and bring to perfection the moſt effectual method of ſo conducting the works of Gunpowder Mills, in the buſineſs of making

king Gunpowder, as to prevent the poſſibility of their being blown up and deſtroyed by exploſion; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

CERTIFICATES and ACCOUNTS of the method having been put in practice in one or more Gunpowder Mills in this kingdom, and that it promiſes, in the opinion of the beſt judges concerned in ſuch works, to anſwer the purpoſe intended, to be produced to the Society on or before the firſt Tueſday in February, 1800.

222. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the firſt Tueſday in February, 1801.

N. B. As an encouragement to perſons to turn their thoughts to improvements of this nature, if any ſhould be made on the preſent method of conducting the buſineſs of Gunpowder-making, which fall ſhort of the

the total prevention of explosion, and they are sent to the Society, for the sake of humanity, the Papers so sent in will receive due consideration, and such Bounty or Reward will be bestowed thereon as they appear to merit.

223. MILL STONES. To the person who shall discover, in Great Britain, a Quarry of Stone fit for the purposes of Mill Stones for *grinding* Wheat, and equal in all respects to that Stone known by the name of FRENCH BURR; the GOLD MEDAL, or ONE HUNDRED POUNDS.

A pair of Mill Stones, at least three feet eight inches diameter, with an account of the situation of the Quarry, and CERTIFICATES that not fewer than two pair of such Mill Stones have been effectually used for grinding Wheat, to be produced to the Society on or before the first Tuesday in February, 1800.

224. The same premium is extended one year further.

The

The ACCOUNTS, SAMPLES, and CERTIFICATES, to be produced to the Society on or before the firſt Tueſday in February, 1801.

225. HEATING ROOMS FOR THE PURPOSES OF MANUFACTURERS. To the perſon who ſhall invent and diſcover to the Society a Method of Heating Rooms, ſuperior to any hitherto known or in uſe, and at a moderate expence, for the purpoſes of Painters, Japanners, and other Manufacturers, ſo as to avoid the neceſſity of iron or copper funnels going through the rooms to convey the ſmoke, whereby the danger from ſuch tunnels may be prevented; the GOLD MEDAL, or FORTY GUINEAS.

A Model, or complete Drawing and Deſcription of the Method, with CERTIFICATES that it has been ſucceſsfully practiſed, to be delivered to the Society on or before the laſt Tueſday in March, 1800.

Premiums

Premiums offered for the advantage of the Britiſh Colonies.

226. NUTMEGS. For the greateſt quantity of Merchantable Nutmegs, not leſs than ten pounds weight, being the growth of his Majeſty's dominions in the Weſt Indies, or any of the Britiſh Settlements on the Coaſt of Africa, or the ſeveral Iſlands adjacent thereto, and equal to thoſe imported from the Iſlands of the Eaſt Indies; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

Satisfactory CERTIFICATES, from the Governor or Commander in Chief, of the place of growth, with an account of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on before the firſt Tueſday in December, 1799.

227. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in December, 1800.

228. CINNAMON. For importing into the port of London, in the year 1799, the greateſt quantity, not leſs than twenty pounds weight, of Cinnamon, being the growth of ſome of the Iſlands in the Weſt Indies belonging to the Crown of Great Britain, or any of the Britiſh Settlements on the Coaſt of Africa, or the ſeveral Iſlands adjacent thereto, and equal in goodneſs to the Cinnamon brought from the Eaſt Indies; the GOLD MEDAL, or FIFTY GUINEAS.

SAMPLES, not leſs than two pounds weight, with CERTIFICATES that the whole quantity is equal in goodneſs; together with ſatisfactory CERTIFICATES, ſigned by the Governor, or Commander in Chief, of the place of growth, with an account of the number of trees growing on the ſpot, their age, and the manner of culture;

ture; to be produced to the Society on or before the firſt Tueſday in January, 1800.

229. CLOVES. For importing into the port of London, in the year 1799, the greateſt quantity of Cloves, not leſs than twenty pounds weight, being of the growth of ſome of the Iſlands of the Weſt Indies, ſubject to the Crown of Great Britain, or any of the Britiſh Settlements on the Coaſt of Africa, or the ſeveral Iſlands adjacent thereto, and equal in goodneſs to the Cloves brought from the Eaſt Indies; the GOLD MEDAL, or FIFTY GUINEAS.

SAMPLES, not leſs than two pounds weight, with CERTIFICATES that the whole quantity is equal in goodneſs, together with ſatisfactory CERTIFICATES, ſigned by the Governor, or Commander in Chief, of the place of growth, with an account of the number of trees growing on the ſpot, their age, and the manner of culture, to be produced to the Society

on or before the firſt Tueſday in January, 1800.

230. The ſame premium is extended one year further.

SAMPLES and CERTIFICATES to be produced on or before the firſt Tueſday in January, 1801.

231. PLANTATIONS OF BREAD-FRUIT TREES. To the perſon who ſhall have raiſed in any of the Iſlands of the Weſt-Indies, ſubject to the Crown of Great Britain, or in any of the Britiſh Settlements on the Coaſt of Africa, or the ſeveral Iſlands adjacent thereto, between the firſt of January, 1798, and the firſt of January, 1799, the greateſt number of Bread-fruit Trees, not fewer than one hundred, and properly fenced and ſecured the ſame, in order to ſupply the Fruit to the Inhabitants; the GOLD MEDAL, or THIRTY GUINEAS.

Proper

Proper ACCOUNTS and CERTIFICATES, ſigned by the Governor, or Commander in Chief, of the methods made uſe of in cultivating the Plants and ſecuring the Plantation, and that the Trees are in a growing and thriving ſtate at the time of ſigning ſuch Certificates, to be produced to the Society, with Samples of the Fruit, on or before the firſt Tueſday in January, 1800.

232. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the firſt Tueſday in January, 1801.

233. The ſame premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the firſt Tueſday in January, 1802.

234. KALI FOR BARILLA. To the perſon who ſhall have cultivated, in the Bahama Iſlands, or any other part of his

Majeſty's dominions in the Weſt Indies, or any of the Britiſh Settlements on the Coaſt of Africa, or the ſeveral Iſlands adjacent thereto, in the year 1796, the greateſt quantity of land, not leſs than two acres, with Spaniſh Kali, fit for the purpoſe of making Barilla; the GOLD MEDAL, or THIRTY GUINEAS.

235. For the next greateſt quantity, not leſs than one acre, the SILVER MEDAL, or FIFTEEN GUINEAS.

CERTIFICATES, ſigned by the Governor, or Commander in Chief for the time being, of the quantity of land ſo cultivated, and of the ſtate of the Plants at the time of ſigning ſuch Certificates, to be delivered to the Society, with Samples of the Kali, on or before the ſecond Tueſday in November, 1799.

236, 237. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in November, 1800.

238,

238, 239. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in November, 1801.

240. DESTROYING THE INSECT COMMONLY CALLED THE BORER. To the perſon who ſhall diſcover to the Society an effectual method of deſtroying the Inſect commonly called the BORER, which has of late years been ſo deſtructive to the Sugar-Canes in the Weſt-India Iſlands, or in any of the Britiſh Settlements on the Coaſt of Africa, or the ſeveral Iſlands adjacent thereto; the GOLD MEDAL, or FIFTY GUINEAS.

The Diſcovery to be aſcertained by ſatisfactory CERTIFICATES, under the hand and ſeal of the Governor or Commander in Chief for the time being, and of ſome other reſpectable perſons, inhabitants of the Iſlands, or other place, in which the remedy

has been ſucceſsfully applied; ſuch CERTIFICATES to be delivered to the Society on or before the firſt Tueſday in January, 1800.

241. The ſame premium is extended one year further.

CERTIFICATES to be delivered on or before the firſt Tueſday in January, 1801.

242. BOTANIC GARDEN IN THE BAHAMA ISLANDS. To the perſon who, before the firſt of January, 1799, ſhall have ſet apart, and, at his own private expence, ſhall have properly fenced and cultivated, the greateſt quantity of ground, not leſs than five acres, in any of the Bahama Iſlands, as a Botanic Garden, for the purpoſe of making experiments in the culture of thoſe articles which are the peculiar production of the tropical climates, and which may tend to promote the commerce and manufactures of this country; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

It

It is required that any perſon claiming the foregoing premium ſhould produce to the Society, on or before the firſt Tueſday in January, 1800, a CERTIFICATE from the Governor or Commander in Chief of the Bahama Iſlands for the time being, of his *having* complied with the above requiſitions, and that the Garden is in a proper ſtate of culture at the time of ſigning ſuch Certificate.

Premiums

Premiums offered for the advantage of the Britiſh Settlements in the Eaſt Indies.

243. BHAUGULPORE COTTON. To the perſon who ſhall import into the port of London, in the year 1799, the greateſt quantity, not leſs than one ton, of the Bhaugulpore Cotton, from which clothes are made in imitation of Nankeen, without dying; the GOLD MEDAL.

A quantity of the Cotton, not leſs than five pounds weight in the pod, and five pounds carded, to be produced to the Society, with proper CERTIFICATES, ſigned by the Secretary to the Board of Trade of Bengal, on or before the laſt Tueſday in February, 1800.

244. The ſame premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced to the Society on or before the laſt Tueſday in February, 1801.

245.

245. The ſame premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced to the Society on or before the laſt Tueſday in February, 1802.

246. ANNATTO. To the perſon who, in the year 1799, ſhall import into the port of London, from any part of the Britiſh Settlements in the Eaſt Indies, the greateſt quantity of Annatto, not leſs than five hundred weight; the GOLD MEDAL.

A quantity of the Annatto, not leſs than ten pounds weight, to be produced to the Society, with proper CERTIFICATES, ſigned by the Secretary of the Board of Trade of the reſpective Settlement, that the Annatto is the produce of ſuch Settlement, on or before the laſt Tueſday in February, 1800.

247. The ſame premium is extended one year further.

The

The SAMPLES and CERTIFICATES to be produced to the Society on or before the laſt Tueſday in February, 1801.

248. The ſame premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced to the Society on or before the laſt Tueſday in February, 1802.

249. TRUE COCHINEAL. To the perſon who, in the year 1799, ſhall import into the port of London, from any part of the Britiſh Settlements in the Eaſt Indies, the greateſt quantity of True Cochineal, not leſs than five hundred weight; the GOLD MEDAL.

A quantity of the Cochineal, not leſs than ten pounds weight, with proper CERTIFICATES, ſigned by the Secretary of the Board of Trade of the reſpective Settlement, that the Cochineal is the produce of ſuch Settlement,

ment, to be produced to the Society on or before the firſt Tueſday in February, 1800.

250. The ſame premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced on or before the firſt Tueſday in February, 1801.

Society's Office, Adelphi, June 1, 1799.

Ordered,

THAT THE SEVERAL CANDIDATES AND CLAIMANTS TO WHOM THE SOCIETY SHALL ADJUDGE PREMIUMS OR BOUNTIES, DO ATTEND AT THE SOCIETY'S OFFICE IN THE ADELPHI, ON THE LAST TUESDAY IN MAY, 1800, AT TWELVE O'CLOCK AT NOON, TO RECEIVE THE SAME; THAT DAY BEING APPOINTED BY THE SOCIETY FOR THE DISTRIBUTION OF THEIR REWARDS: AND BEFORE THAT TIME NO PREMIUM OR BOUNTY WILL BE DELIVERED, EXCEPTING TO THOSE WHO ARE OUT OF THE KINGDOM, OR PREVENTED BY UNAVOIDABLE ACCIDENTS.

IN CASES WHERE THE SOCIETY MAY THINK FIT TO ADMIT EXCUSES FOR NOT ATTENDING IN PERSON, DEPUTIES MAY BE SUBSTITUTED TO RECEIVE THE REWARDS, PROVIDED SUCH DEPUTIES ARE EITHER MEMBERS OF THE SOCIETY, OR THE SUPERIOR OFFICERS THEREOF.

GENERAL

GENERAL CONDITIONS.

NOTWITHSTANDING the Society reſerve to themſelves the power of giving, in all caſes, ſuch part only of any Premium as the performance ſhall be adjudged to deſerve, or of withholding the whole, if there be no merit; yet the Candidates may be aſſured the Society will always judge liberally of their ſeveral Claims.

It is required that the matters for which Premiums are offered, be delivered in without names, or any intimation to whom they belong; that each particular thing be marked in what manner each Claimant thinks fit, ſuch Claimant ſending with it a paper ſealed up, having on the outſide a correſponding mark, and on the inſide the Claimant's name and addreſs: and all Candidates are to take notice, that no Claim for a Premium will be attended to, unleſs the conditions of the Advertiſement are fully complied with.

No

No Papers ſhall be opened, but ſuch as ſhall gain Premiums, unleſs where it appears to the Society abſolutely neceſſary for the determination of the Claim; all the reſt ſhall be returned unopened, with the Matters to which they belong, if enquired after by the Mark, within two years; after which time, if not demanded, they ſhall be publicly burnt, unopened, at ſome meeting of the Society.

All Models of Machines, which obtain Premiums or Bounties, ſhall be the property of the Society.

All the Premiums of this Society are deſigned for Great Britain, unleſs expreſsly mentioned to the contrary.

The Claims ſhall be determined as ſoon as poſſible after the delivery of the ſpecimens.

No perſon ſhall receive any Premium, Bounty, or Encouragement from the Society, for any matter for which he has obtained, or purpoſes to obtain, a patent.

A Candidate for a Premium, or a perſon applying for a bounty, being detected in any diſengenuous method to impoſe on the

the Society, ſhall forfeit ſuch Premium or Bounty, and be deemed incapable of obtaining any for the future.

The Performances which each year obtain Premiums or Bounties are to remain with the Society until after the public diſtribution of Rewards.

No member of this Society ſhall be a Candidate for, or entitled to receive, any Premium, Bounty, or Reward whatſoever, except the Honorary Medal of the Society.

Where Certificates are required to be produced in claim of Premiums, they ſhould be expreſſed, as nearly as poſſible, in the words of the reſpective advertiſements, and ſhould not be from the Candidate (ſolely), but from ſome other perſon or perſons who have a poſitive knowledge of the facts certified.

Where Premiums or Bounties are obtained in conſequence of ſpecimens produced, the Society mean to retain ſuch part of thoſe ſpecimens as they may judge ne-

ceſſary, making a reaſonable allowance for the ſame.

No Candidates ſhall be preſent at any meetings of the Society or Committees, or admitted at the Society's Rooms, after they have delivered in their Claims, until ſuch Claims are adjudged, unleſs ſummoned by the Committee.

N. B. Any information or advice that may forward the deſigns of this Society for the public good, will be received thankfully, and duly conſidered, if communicated by letter, addreſſed to the Society, and directed to Mr. More, the Secretary, at the Society's Office, in the Adelphi Buildings, London.

*** In caſe any perſon ſhould be inclined to leave a ſum of money to this Society, by will, the following form is offered for that purpoſe:

Item. I give and bequeath unto A. B. and C. D. the ſum of upon condition and the intent that they, or one of them, do pay the ſame to the Collector for the time being, of a Society in London, who now call themſelves the Society for the Encouragement of Arts, Manufactures, and Commerce; which ſaid ſum of I will and deſire may be paid out of my perſonal eſtate, and applied towards the carrying on the laudable deſigns of the Society.

By order of the Society,

SAMUEL MORE, Secretary.

PAPERS

IN

AGRICULTURE.

AGRICULTURE.

THE Thanks of the Society were this Seſſion voted to NATHANIEL KENT, Eſq. for the following Communication; and he was deſired to make the due acknowledgments of the Society to HIS MAJESTY, for having been graciouſly pleaſed to permit ſo full and exact an Account of the Improvements on the Farm in the Great-Park, at Windſor, to be tranſmitted to the Society, whereby ſo much benefit is likely to accrue to the Public.

SIR,

UPON mentioning to you ſome time ſince, that there had been ſome practices in Huſbandry, on his Majeſty's Farms under my ſuperintendance in Wind-

ſor Great Park, which I conceived were not generally known; and upon your giving me reaſon to think the Society for the Encouragement of Arts, &c. from its laudable deſire to communicate to the Public every thing that promiſes advantage to it, would not be unwilling to allow me a few pages in its next publication; and being indulged with His Majeſty's gracious permiſſion, to ſtate any matter that I may diſcretionally judge proper to communicate; I am induced to lay before you a few particulars, which ſome Gentlemen and Farmers, under ſimilar circumſtances, may perhaps think deſerving notice.

But before I enter upon any particular deſcription of what I have to offer, it will not, perhaps, be unintereſting to the Society, to know the grounds upon which His Majeſty's large ſyſtem of Agriculture has been founded.

In the year 1791, the Great Park at Windſor, about 4000 acres, fell into His Majeſty's poſſeſſion. It might truly be called

called a rough jewel. The whole, as a natural object, was grand and beautiful, of a foreſt appearance; but the parts were crowded and indiſtinct. The ſoil was various, ſome parts clay and loam, and ſome ſharp gravel or poor ſand; a great part of the former was covered with ruſhes and mole-hills, and the latter with fern and moſs.

About 1000 acres of the lighteſt part were ſeparated from the reſt at one extremity, and formed what is called the Norfolk Farm: about 400 acres more, at the other extremity, of a good loamy ſoil, were ſeparated, and called the Flemiſh Farm, both being named from the nature of the huſbandry meant to be adopted upon them.

The reſt (about 2,400 acres) remains ſtill in Plantations and Park; and though ſo much reduced, yet, from the improvements which have been made upon it, is now capable of carrying more ſtock than the whole 4000 acres did before. All the unſound wet parts have been drained by the Eſſex mode, ſo as to be rendered firm, and

and productive of an improved herbage. The mole-hills have been levelled, chiefly by dragging, and the coarſe and moſſy parts fined by repeated harrowing and rolling, (being one of the firſt improvements upon Park Land of this deſcription); beſides which, a variety of beauty has been laid open, by clearing the valleys and low parts, to give a bolder effect to the woody ſcenes upon the higher ground; and by making judicious openings, ſo as to break ſtrait lines, and ſeparate parts that were in ſome places too heavy and ſamely: ſo that the ſame extent of land has now not only a much larger appearance, but exhibits a much greater variety of ground. The truth of this, every impartial perſon who knew the place before His Majeſty cauſed theſe improvements to be made, muſt allow. I have only to add, that though prejudice may have taken up an idea that there has been too great a ſacrifice of timber in effecting theſe improvements, truth will deny it. There has not been a tree taken down,

but

but what was either in decay, or removed either to give room for the growth of others, or to ſet them off to greater advantage in picturesque appearance.

I come now to the object in view, as before hinted, which is to ſtate the motives which I am inclined to think induced His Majeſty to adopt the farming ſyſtem upon ſo large a ſcale, and next to ſhew the reſult.—Theſe I conceive were chiefly to create uſeful labour for the induſtrious poor in the neighbourhood, and for trying experiments in Agriculture, to excite imitation where ſucceſs might encourage it.

The Norfolk Farm borders on that extenſive waſte called Bagſhot-heath, hitherto conſidered too barren for cultivation, though large tracts of a ſimilar quality have been long ſince rendered uſeful to the community in the ſouth-weſt part of Norfolk. Arable land of this deſcription is generally managed there under a five-courſe ſhift; firſt, wheat; ſecond, turneps; third, barley with ſeeds, which continue laid two years.

But

But as the ſeeds turn to very little account after the firſt year, His Majeſty's, which though a five-courſe ſhift likewiſe, of one hundred acres in a ſhift, is upon a much improved courſe of cropping; as thus—firſt, wheat or rye; ſecond, the irregular ſhift; third, turneps; fourth, barley or oats; fifth, clover.—The irregular ſhift, which is of great uſe on a light land farm, may perhaps want a little explanation. It is meant to be partly productive, and partly preparative. Forty acres of it are ſown with vetches, to be fed off; forty are ſown the latter end of Auguſt with rye, for early feed the next ſpring for the ewes and lambs; the remaining twenty acres are planted with potatoes, and the whole comes round for turneps the next year.

From the advantage of running ſheep in the Park, this Farm has been brought ſurpriſingly forward, conſidering the ſhort time it has been cultivated; and a great part of it, which produced nothing but heath and moſs, and would have been dear

at

at five ſhillings an acre to rent, now produces crops worth more than the original fee-ſimple of the land.

Brevity checks me from going farther into a general deſcription; but the following particulars may deſerve notice.

The comparative advantages of the labour of Horſes and Oxen have been for ſome time under the conſideration of the Public. His Majeſty has unqueſtionably tried the latter upon a larger ſcale than any other perſon, as he does not work leſs than one hundred and eighty Oxen upon his different farms, parks, and gardens, and has found them to anſwer ſo well, that there is not now a horſe kept.—Upon the two Farms, and the Great Park, two hundred are kept, including thoſe coming on and going off. Forty are bought in every year, riſing three years, and are kept as ſucceſſion oxen in the Park; one hundred and twenty are under work; and forty every year are fatted off, riſing ſeven years.

The

The working Oxen are moſtly divided into teams of ſix, and one of the number is every day reſted, ſo that no ox works more than five days out of the ſeven.—This day of eaſe in every week, beſides Sunday, is of great advantage to the animal, as he is found to do better with ordinary keep and moderate labour, than he would do with high keep and harder labour. In ſhort, this is the firſt ſecret to learn concerning him; for an ox will not admit of being kept in condition like a horſe, artificially, by proportionate food to proportionate labour.

Theſe Oxen are never allowed any corn, as it would prevent their fatting ſo kindly afterwards. Their food in ſummer is only a few vetches, by way of a bait, and the run of coarſe meadows, or what are called leaſows, being rough woody paſtures. In winter they have nothing but cut food, conſiſting of two thirds hay, and one third wheat-ſtraw; and the quantity they eat in twenty-four hours is about twenty-four pounds of hay and twelve of ſtraw: and on the

the days of reſt, they range as they like in the ſtraw-yards; for it is to be obſerved, that they are not confined to hot ſtables, but have open ſheds, under which they eat their cut provender, and are generally left to *their* choice to go in and out. Under this management, as four oxen generally plough an acre a day, and do other work in proportion, there can be no doubt but their advantage *is* very great over horſes, and the reſult to the public highly beneficial.

The Oxen which are brought on in ſucceſſion, run the firſt ſummer in the Park, and in the leaſows and temporary ſtraw-yards in the winter; by which temporary ſtraw-yards, I would have it underſtood, that they are made in different places, ſo that the manure which they make may be as near to the ſpot where it is wanted as poſſible.

The forty Oxen which go off are ſummered in the beſt paſture, and finiſhed with turneps the enſuing winter.—The uſual way has been to draw the turneps, and to give

give them either ſtalled or in cribs placed in the yard, with plenty of ſtraw to browſe and lie upon: but laſt winter an experiment was tried, which anſwered extremely well, and will be again repeated next winter: this was, penning the oxen by day upon the turnep-land, in the manner that ſheep are penned, with this only difference, that the turneps were thrown up into cribs, inſtead of being left to be trodden into the ground; and in the nights they were driven into a yard, with a temporary ſhed well littered with ruſhes, fern, and leaves, and turneps and barley-ſtraw given to them in cribs. They thrived very faſt, and every one of them made at leaſt eight loads of good muck in the night-yard, beſides the benefit done in treading and dunging on the land in the day-time, which was very great, the ſoil being very light.—The reſult of the Ox ſyſtem is, that charging the ox for his agiſtment the firſt year, for the value of the graſs and turneps the laſt year, and putting what he has in three intermediate

mediate years as an equivalent for his labour, after every allowance for riſk, each Ox will pay at leaſt twenty per cent. profit. —In what inſtance does a horſe produce ſo much?

I do not allow that the Ox can be uſed on *all ſoils*; upon a very ſtony ſoil he cannot: nor can the horſe in all places be wholly excluded from Huſbandry; but every occupier of a large farm may at leaſt uſe ſome Oxen to very great advantage. They are all worked at Windſor in collars, as their ſtep is found to be much more free than when coupled together with yokes; and they are found to do their work with much greater eaſe in collars than in yokes, which ought every where to be exploded.

The different kinds of Oxen are in ſome meaſure ſuited to the ſoil.—Upon the Norfolk Farm, which is a light ſoil, the Devonſhire ſort are uſed; upon the Flemiſh Farm, where the ſoil is ſtrong and heavy, the Herefordſhire; and in the Park, where the buſineſs is carting, harrowing, and

rolling, the Glamorganſhire.—They are all excellent in their different ſtations.

It may not be improper to mention a very ſimple method which has been diſcovered, of firſt training them to the collar, which is nothing more than putting a broad ſtrap round their necks, and faſtening one end of a cord to it, and the other to a large log of wood, and letting the Ox draw it about as he feeds in his paſture, for three or four days, before he is put into harneſs, by which means he is very much brought forward in docility.

I have before obſerved, that twenty per cent. may be conſidered as the average profit of an Ox; ſtating them to be bought in at £.10, and allowing them to ſell for £.25, taking off £.10 for the two years they are not worked: but laſt year beans being of very little value, they were kept longer than uſual, by being ſtall-fed with bean-meal, which anſwered very well, as they were brought to an average of nearly £.30; and one of them, a Glamorganſhire

morganſhire Ox, originally bought for £.8, and, from his compact round make, always called the Little Ox, thrived to ſuch a ſurpriſing degree, that he became too fat to be able to travel to Smithfield, and was therefore ſold to Mr. Charlwood, a neighbouring butcher, for £.47.

Next to the advantage obtained from oxen, as much benefit as poſſible has been endeavoured to be derived from ſheep, by means of the fold.—Two ewe flocks are kept, of four hundred each: the ſoil being light and dry, admits of winter-folding (except when the weather is wet), upon the young clover;—a practice much to be recommended, as it is productive of a great crop of clover, and prepares the land the enſuing autumn for a crop of wheat, without any further aſſiſtance. Another excellent practice is folding upon light land, in dry weather, immediately upon the ſowing of the wheat, which may be put forward, or kept back, a fortnight or three weeks, on that account; and it is not amiſs

to have the fold rather large, and to give the ſheep a turn or two round the fold in a morning before they are let out, to tread and ſettle the land, which does a great deal of good, over and above their dung.

A third method of folding has been found to anſwer almoſt beyond deſcription. This was firſt tried in the winter of 1793; but from an idea of the ſhepherd, that it injured the ſheep, has been ſince diſuſed: but as there is good reaſon to believe that there was no juſt ground for ſuch an opinion, it is meant to be revived next winter.

A dry ſheltered ſpot is ſelected, and ſods of maiden earth, a foot deep, are laid over the ſpace of a very large fold. It is then bedded thinly with ruſhes, leaves of trees, fern, moſs, ſhort ſtraw, or ſtubble; and in hard or wet weather, the flock, inſtead of being penned upon the clover in the open fields, is put into this warmer fold, where the uſual quantity of hay is given to them in racks; and every night they are ſo penned, the fold is freſh littered. When this has been

been continued, at intervals, during the winter, a layer of lime, chalk, rubble, or aſhes, ſix inches thick, is ſpread over the whole ſurface—and, when it has heated together, about the month of April, the whole is turned up, and mixed together, and makes the very beſt manure that can be uſed for turneps.

I have been particular in deſcribing theſe methods of folding, as they are not common in any place, and in others entirely unknown, and to Gentlemen who have parks and large plantations which afford abundance of leaves, this hint may be the more deſerving attention.

Upon the Norfolk Farm the land not having been yet marled or clayed, the clover is apt ſometimes to fail, which is alſo the caſe elſewhere, upon the ſame ſort of land. When this happens, His Majeſty does what every other perſon in a ſimilar ſituation ſhould do; inſtead of letting the ground remain unproductive, the next year it is ſowed with vetches, which are nearly

as valuable as the clover, and wheat always grows remarkably kind after them.

As to implements, the Norfolk plough is chiefly what is uſed; and upon a light ſoil, it is certainly preferable to any other. It ploughs a cleaner furrow, by completely moving the whole body of earth, and inverts it much better than any other plough; and to eſtabliſh its ſuperiority over the common ploughs of the neighbourhood, I need only add, that from its conſtruction it is nearly the draught of an ox eaſier. There is likewiſe a Norfolk harrow, very uſeful for harrowing what are called bruſh-turneps, or any other turneps, preparatory to their being hoed.—I muſt be allowed, likewiſe, to mention the drill-roller, which conſiſts of caſt-iron rings, made at the Norwich Foundery, and ſlipt on upon a round piece of wood, as an axle-tree. This is one of the beſt things that has ever been introduced, for the preparation of the land for any ſort of corn, where the ſoil will admit of its being uſed.

By

By the corn being ſo well depoſited, it takes better root, and at leaſt one fourth of the quantity uſually ſown may be ſaved.

The Flemiſh Farm, which I have before mentioned, was ſo named from an intention, at firſt, of carrying on a ſyſtem of huſbandry ſimilar to that practiſed in Flanders, which conſiſts of an alternate crop for man and beaſt; but the ſoil being ſtrong and coheſive, upon trial, it has been found to anſwer beſt under a four-courſe ſhift, more like ſome parts of Glouceſterſhire; as thus—firſt year, wheat; ſecond, cabbage or clover; third, oats; fourth, beans.—The quantity of arable land on this Farm is one hundred and ſixty acres, or forty acres in a ſhift. There are two things obſerved upon this Farm, which may be worth notice;—The firſt is the practice which has for theſe two years paſt been adopted, by taking off the tops of the beans juſt as the bloſſom is ſet; this not only improves the quality, but increaſes the quantity, and cauſes them to ripen ſooner, which is a

conſiderable advantage, by giving time to get the ſucceeding crop of wheat in perhaps a fortnight earlier. The other is, that of ſowing clover early in the ſpring, among twenty acres or one half of the wheat, and buſh-harrowing and rolling it in. This has produced a very fair crop of clover the next year; and the other half, after the wheat, is winter and ſpring fallowed, and planted with cabbage. There is a double advantage reſulting from this; that one half of this ſhift, ſo managed, becomes a ſummer crop, and the other half a winter crop; and by obſerving the next year to change the parts, by ſowing the clover where the cabbage was before, the clover and cabbage do not come round upon the ſame ground but one in eight years.

Cabbage has been tried ſeveral years, but His Majeſty's huſbandmen never got into the right management of it till this year; but now the crop is remarkably fine.

It

It will not be improper to mention, that the drum-headed cabbage is the beſt ſort; that the ſeed ſhould be ſown in Auguſt, the plants firſt ſet out in November, and tranſplanted for good in July. The next thing to be noted is their application:— They are certainly inferior to turneps for fatting, but ſuperior in the increaſe of milk, either of cows or ewes, and therefore they are particularly good where there is a dairy or a breeding flock of ſheep: and I truſt His Majeſty will, the next yeaning ſeaſon, try an experiment, of which I have high expectation, which is to ſlice or quarter the cabbage, and feed the ewes with them upon ſuch of the meadows as want manuring, which I flatter myſelf will be of ineſtimable ſervice to the ewes and lambs, and be the means of increaſing the next years crop of hay conſiderably.

The true light of viewing theſe improvements is to conſider them as a ſort of new creation to the public; for, as it is a fact not to be controverted, that the reduced

duced number of acres in the Park, from their improved ſtate, ſupport as many deer and other cattle as the whole did before, the produce obtained from the Farms is all clear gain; and as the crop of wheat and rye from the 140 acres ſown, upon the moſt moderate calculation, may be ſet at 3,360 buſhels, and allowing ſix buſhels to a human mouth, this gives a yearly proviſion in bread for 560 people; to ſay nothing of the fatting-off of forty oxen, the breed of 800 ſheep, and the growth of at leaſt 5000 buſhels of oats and beans; all of which, it muſt be obſerved, goes in aid of the public market, as the work is done by Oxen entirely.

As more experiments are in future made, I may perhaps trouble the Society with an account of them, as I am perſuaded they cannot be regiſtered any where elſe, to give them the credit, and to excite the imitation I flatter myſelf they may deſerve: but for the preſent, I ſhall cloſe my obſervations upon His Majeſty's Farms, with a deſcription

tion of his Mill, which I conſider as the moſt benevolent thing that can be done for the Poor, and which I moſt earneſtly recommend to all Gentlemen of landed property, who have like means of doing it. A ſmall Over-ſhot Mill is erected, and worked by the waſte water from the lake below the Lodge, where a ſufficiency of corn, two thirds wheat and one third rye, is ground, dreſſed, and given to all the labourers, at ſixteen pence per ſtone of fourteen pounds, in quantities ſuitable to the ſize of their families, which is the firſt of all comforts to them, and a ſaving of at leaſt twenty per cent. from what it would coſt them to buy it from the mealmen or ſhopkeepers.

I am, SIR,

Your obedient humble ſervant,

NATHANIEL KENT.

Craig's Court,
30th October, 1798.

Mr. MORE.

The

The GOLD MEDAL, or THIRTY GUINEAS, at the option of the Candidate, being the Premium offered for PLANTING OZIERS, was this Seſſion adjudged to THOMAS PAGE, of Ely, Eſq. from whom the following Accounts and Certificate were received, and who made choice of the Honorary Reward.

SIR,

SEEING in the yearly publication of the Society for the Encouragement of Arts, Manufactures, and Commerce, an account of the Premiums offered by the Society to the perſon who ſhall plant the greateſt number of acres with Oziers in the year 1798, I beg leave to inform the Society what I have done this year. In the months of March and April laſt, I planted ſeven acres and a half of the various Oziers fit for the purpoſe of baſket-making, conſiſting of the Ozier, Spaniard, New-kind, and

and a great deal of what is called in this part of the country the laſt *new kind*, not leſs than thirteen thouſand to the acre, and on ſome acres conſiderably more than fourteen thouſand.

For my Certificate of their planting, and that they are in a thriving ſtate, I beg leave to refer you to John Phillips, Eſq. of Ely, of whom I had the ſets, and partly under whoſe direction and advice, he having practiſed a great deal, I did the planting.

Should the Society deem that what I have done entitles me to their Honorary Reward, I ſhall think myſelf highly flattered by ſuch a mark of their approbation.

I am, SIR,

Your moſt obedient ſervant,

THOMAS PAGE.

Ely,
Nov. 15th, 1798.

Mr. MORE.

I JOHN PHILLIPS, of Ely, Member of the Society inſtituted at London for the Encouragement of Arts, Manufactures, and Commerce, do certify, that the account given by Thomas Page, Eſq. and herewith tranſmitted to you, of the Ozier Plantations made by him in the months of March and April laſt, is true. The ſets were furniſhed by me, becauſe the other Planters either had not or would not part with any of the beſt ſorts. About four acres were planted with the two ſorts of New-kind and Weſt-country Spaniard; and the remainder with the common Spaniard, the Red Welch, and four or five varieties of the common Ozier. They are well guarded by ſufficiently wide and deep ditches, and have been kept very clean from weeds. They are not vigorous, but they are as flouriſhing as any that I have ſeen this year. All the young Plantations have ſuffered much by what is commonly called the *blight*, but which is none other than a ſmall brown fly, that feeds upon

upon the opening bud, and whoſe young, generated between the bud and the bark, afterwards devour the leaves and ſhoots. Mr. Page has ſpared neither trouble nor expence in their proper care and management; and if the ſoil, which is a black peat, is ſufficiently ſtrong to carry them, I have no doubt but they will recover from the ravages of the fly, by the aid of a a copious ſupply of water next ſummer, for which he has made proviſion, by laying a tunnel to convey it from the river to the plantations.

Ely,
Nov. 25th, 1798.

SAMUEL MORE, Eſq.

TWENTY GUINEAS, being the Premium offered for the Culture of BEANS and WHEAT, was this Seſſion adjudged to Mr. ROBERT DUDGEON, of Tynningham, from whom the following Papers were received.

SIR,

HAVING been in the practice of ſowing Wheat after drilled Beans, I take the liberty of laying before the Society for the Encouragement of Arts, Manufactures, and Commerce, an account of three fields, containing nearly twenty-three and a half acres (Engliſh ſtatute meaſure), drilled with Beans in the ſpring of 1797, and ſown with Wheat the ſame year.

One hundred and twenty-ſix buſhels of Tick Beans were ſown, which, at an average, is five buſhels one peck and a half of ſeed per acre. The total produce was one hundred and thirteen quarters, five buſhels,

buſhels, and three pecks; that is, thirty-eight buſhels, three pecks, per acre, average produce.

The field marked N° 1 in the ſurveyor's certificate, containing 8.26. acres, is part ſtrong red clay, upon a lime-ſtone bottom, and part a mixed ſoil of clay and loam, upon the ſame bottom; but the ſoil is of a greater depth. This field was twice ploughed. The firſt furrow was given in October, 1796. In February, 1797, it was dunged at the rate of ſixteen cart-loads per acre (containing from fourteen to ſixteen hundred weight each), and immediately got a ſecond ploughing, the beans being drilled into the bottom of the furrow, behind the plough. Two acres and a half were drilled at the diſtance of every third furrow, making an interval of twenty-four inches between the rows; but this being too wide, the remaining part of the field was drilled at the diſtance of two furrows, making eighteen inches width between the rows. The ſame quantity of

ſeed per acre, viz. five buſhels and three pecks, was ſown in both caſes; and at harveſt, no apparent difference could be obſerved in the crop. The beans were drilled on the 27th and 28th of February, and the 1ſt of March, and the field completely harrowed. Some days afterwards, having had a froſt, which made the ſoil crumble and fall, it was harrowed a ſecond time, to reduce the mould to as fine a ſtate as poſſible.—This field was reaped on the 6th, 7th, and 8th of October; and once ploughed and ſown with wheat on the 10th and 11th of November, 1797. The produce of beans was forty-ſeven quarters, or forty-five buſhels two pecks per acre.

The field N° 2, containing 10.88. acres, is part clay, the ſame as N° 1, upon a limeſtone bottom, at a conſiderable depth, and part a light deep gravelly ſoil, with a ſubſoil of red clay. It was twice ploughed, firſt in October, 1796, and laſtly in February, 1797, immediately after which it was formed into ribs of twenty inches

inches width, by making the horſe on the left-hand ſide of the plough* go in the laſt drawn furrow. The beans were drilled between theſe ribs on the 2d, 3d, and 11th of March, and covered by harrowing firſt along the drills, and then acroſs with a common harrow, till the ſurface was perfectly flat and the mould fine, the beans being left at a depth of four inches.—The quantity of ſeed per acre was five buſhels. This field was reaped on the 4th, 5th, and 6th of October; dunged on the bean ſtubble, at the rate of fifteen cart-loads per acre; once ploughed, and ſown with wheat, on the 13th, 14th, and 22d of November, and the 21ſt of December, 1797. The produce of beans was fifty-one quarters, four buſhels, or thirty-ſeven buſhels, two pecks, per acre.

The field N° 3, containing 4.22. acres, is a light gravelly ſoil, upon a ſubſoil

* In this county, we plough with two horſes only, which are yoked abreaſt, and go without a driver.

of ſand mixed with ſmall gravel. It was twice ploughed, firſt in October, 1796, and laſtly in February, 1797. It was afterwards ribbed in the ſame manner as N° 2, and the beans drilled on the 16th and 17th of March, at the rate of five buſhels two pecks per acre, and covered by harrowing the ſame as N° 2. This field was reaped on the 21ſt of September, and one half of it ploughed. It was then dunged at the rate of eighteen cart-loads per acre, and the whole field ploughed over, and ſown with wheat on the 28th of December, 1797. But the crop of wheat upon that part of the field which got two furrows, was much inferior to that where it got only one; which ſhews the impropriety of looſening ſoils of this quality by repeated ploughing, particularly where the ſubſoil is ſo little calculated for the retention of moiſture. The produce of beans upon this field was fifteen quarters one buſhel, or twenty-eight buſhels two pecks, per acre.

Remark.

Remark.—The ſuperior produce of field N° 1, is not to be attributed to its being drilled in a different manner from N° 2 and 3, but to its being dunged previous to the bean crop, and to the froſt happening ſo opportunely after drilling for getting the mould brought to a fine ſtate. Indeed, the mode of drilling purſued in this field, is what I never practice, but where local circumſtances prevent the other from being adopted: for, if the furrows are taken ſo as to ſtir the ſoil to a proper depth, the ſeed is then laid at too great a diſtance from the ſurface; in which caſe it generally ſends up a weak plant. And if ſuch a furrow is only taken as will place the ſeed at a proper depth, the bottom ſoil is then left unſtirred, whereby the paſture of the plant is greatly circumſcribed. The tap root may indeed penetrate the ſubſtratum, but the ſmall lateral fibres are prevented from ſpreading as they ought to do.

The drill employed was the common hand-drill uſed in this county, which

is puſhed along by two handles, like a wheelbarrow, and ſows one row at a time. The wheel is about twenty-two inches diameter, of ſolid deal, upon the axle of which is alſo fixed a notched roller of two inches and three quarters diameter, and two inches long, which turns in the fore part of the drill-box.—The quantity of ſeed is regulated by a ſlider, which moves up and down in the fore part of the box, by an adjuſting ſcrew fixed at top; the ſlider having a ſtrong bruſh projecting from its lower end, which ſweeps upon the notched roller. There is alſo a ſluice or ſlider that lies flat upon the bottom on the inſide of the drill-box. This ſlide projects between the two handles of the drill, ſo as to be within reach of the perſon that guides it; who, by puſhing the ſlide forward, completely covers the notched roller, and prevents any of the beans getting out while the drill is turning at the end of the ridges. A woman or boy will drill from two to two acres and a half per day, when the rows are at twenty inches diſtance.

All

All the fields were harrowed into a fine mould after ſowing; and when the beans had got above the ground, and the firſt leaves were fairly opened and green, they were again harrowed with a common harrow, which deſtroyed a crop of annual weeds, and ſaved a great deal of hand-weeding. The bean, at this ſtage of its growth, is poſſeſſed of a toughneſs that prevents it from receiving any injury by the harrow, provided the land has been previouſly brought to a fine mould, and the operation performed in dry weather. But if the ſurface is rough, the young plants are in danger of being covered by the clods; and if the harrowing is given at an earlier period, before the leaf has acquired a green colour, the bean is then in ſo tender a ſtate as to be broken and deſtroyed by the harrow.

Horſe-hoeing.—The intervals were horſe-hoed at the proper ſeaſon with a ſmall plough, which is ſo conſtructed as to prevent any of the mould falling to the left-

hand ſide. This plough was run cloſe alongſide of one row, by which the mould was turned over to the root of the next. The whole having been gone over in this way, making one furrow in each interval, the fields were allowed to lie in that ſtate for a week, in order to give the weeds time to wither. The hoeing was then reverſed, and the mould turned back again to the other ſide, which completely deſtroyed every weed between the rows.

Expence of Cultivation, per Acre.

	s.	*d.*	
Each ploughing, -	5	3	per acre.
Ribbing, - -	3	2	ditto.
Sowing, - -	3	2	ditto.
Covering the ſeed,	1	8	ditto.
Harrowing to kill weeds, -	1	0	ditto.
Horſe-hoeing, - -	3	0	ditto.
Hand-weeding, -	2	4	ditto.

Application

Application of the Straw.—The bean ſtraw was uſed as fodder for the working horſes in winter; for which purpoſe it is fully equal to pea ſtraw, commonly uſed in this part of the country; and when it is well got, the horſes are fonder of it than they are of pea ſtraw.

The ſeed-wheat, ſown after the twenty-three acres and a half of drilled beans before mentioned, was raiſed by me from a ſingle grain; the produce of which, viz. five hundred and forty grains, I planted in the ſpring of 1793. In the ſpring of 1794 I planted the returned produce upon a clover lay, after once ploughing, in rows twelve inches wide, and four inches between the plants, two grains being put into each hole; but from being planted in the ſpring, and a great drought following, the return was very ſmall. This produce was ſown broad-caſt, in the ordinary way, and produced, in 1795, twelve buſhels three pecks. This was likewiſe ſown in the ſame manner, and produced, in 1796, fifteen quarters; which being

being alſo ſown broad-caſt, produced, in 1797, more than I had occaſion to uſe as ſeed that ſeaſon.

I have for ſome time practiſed the raiſing of my ſeed-corn from the produce of a ſingle grain, picked while growing in the field, and find it a conſiderable improvement, as it equalizes the period of ripening, and produces a better ſample at market, the grain being all nearly of a ſize.

As the Society wiſh for accounts of wheat ſown after drilled beans, I take the liberty of ſtating (in addition to the above) the following crops, which I have raiſed in that rotation.

In 1792 I drilled forty-ſix acres with beans from the 14th to the 28th of March, the land being all ribbed at twenty inches wide, after being moſt of it twice ploughed; the crop was reaped from the 22d of September to the 16th of October, but the extreme wetneſs of the ſeaſon prevented the beans being cleaned off the land till the 10th of November, which was ſown with wheat

wheat from the 18th of February to the 14th of March, 1793.

In 1793 I drilled ſixteen acres and a quarter with beans; in 1794, twenty-ſix acres and a quarter; in 1795, twenty-one acres and a quarter; and in 1796, three acres, all which were followed by wheat in their reſpective years. And the bean-ſtraw of theſe ſeveral crops was uniformly applied as fodder for the working horſes.

As the early ſeaſon at which beans are generally ſown, prevents the ſoil from being ſo well prepared as for the later ſown ſpring grains,—in order to aſcertain how late they would admit of being ſown, I drilled a buſhel ſo late as the 19th of April in 1792. The crop was reaped on the 16th of October, and produced twelve buſhels two pecks; but the grain was of an inferior quality.

We have a ſpecies of pea in this county, which admits of being ſown ſo late as the month of May, and ripens at the uſual ſeaſon. If a bean with the ſame properties could be procured, it would be a moſt deſirable

deſirable acquiſition; as the land would be ſo completely prepared before the time of ſowing, that with proper horſe-hoeing the bean fields would be as clean and fit for wheat as a complete ſummer fallow.

The procuring a ſpecies of bean poſſeſſing ſuch qualities, would be an enquiry not unworthy of a Society ſo eminent for their patriotic exertions in the improvement of the country.

Hoping the Society will excuſe the freedom I have uſed, in taking up ſo much of their time with theſe additional ſtatements,

I am, SIR,

Your very humble ſervant,

A PRACTICAL FARMER.

Mr. MORE.

THIS is to certify, That I have meaſured the under-mentioned fields, belonging to Robert Dudgeon, Farmer, in Tynningham, in the pariſh of Whitekirk, and county of Haddington, and find the contents of each to be as follows, viz.

N° 1.

N° 1.	Chalk Park - -	8.26 acres
2.	Draper's ditto - -	10.88
3.	Redhugh Brae Park	4.22
	Amount in Engliſh meaſure	23.36 acres

The above meaſure includes only the arable part of each field.

To my certain knowledge theſe fields were in drilled beans crop 1797, and ſown with wheat the ſame year.

WILLIAM DICKINSON,
Land-Surveyor.

WE, George Meickle, Farmer, in the Knows Milln, and W. Hunter, Farmer, of Knows, pariſh of Whitekirk, do hereby certify, that Mr. Robert Dudgeon, Farmer, of Tynningham, in the pariſh of Whitekirk and county of Haddington, drilled in the month of March, 1797, twenty-three acres and a half nearly

nearly of land with beans, and ſowed the ſame with wheat the end of the ſame year, 1797.

As witneſs our hands, this 18th day of October, 1798,

GEORGE MEICKLE,
WILLIAM HUNTER.

SIR,

THE within certify my having drilled twenty-three acres and a half of land with beans, in three fields, in 1797, and ſowed the ſame with wheat the end of the ſame year, as ſtated in the account accompanying this, marked "An Account of twenty-three acres and a half of land drilled with beans in 1797, and ſowed with wheat the ſame year."

I am, SIR,
Your humble ſervant,
ROBERT DUDGEON,
Farmer, Tynningham, near Dunbar.

Mr. MORE.

SIR,

I WAS favoured with yours of the 21ſt, wiſhing to be informed if I had ſubſcribed as witneſs to a certificate of Mr. Robert Dudgeon, of Tynningham, near Dunbar. In anſwer to which, I did ſubſcribe to a certificate of Mr. Robert Dudgeon having ſown twenty-three acres thirty-ſix hundred parts of one acre with beans, in the year 1797, and having ſown the ſame land with wheat in the ſame year.

Your moſt humble ſervant,
GEORGE MEICKLE.

Knows Mill,
Nov. 24, 1798.

MR. MORE.

The

The GOLD MEDAL or THIRTY GUINEAS, being the Premium offered for POTATOES for feeding CATTLE and SHEEP, was this Seſſion adjudged to Mr. WILLIAM SEATON, from whom the following Account and Certificate were received. Mr. Seaton made choice of the Pecuniary Reward.

An Account of the Expence of cultivating ſix acres of Land for, and planting the ſame with, Potatoes, and of the produce and value thereof for feeding Cattle, by Mr. William Seaton, of Tilgate, in the pariſh of Worth, in the county of Suſſex, and for which he begs to lay in his claim for the Premium offered by the Society for the Encouragement of Arts, Manufactures, and Commerce.

THE land had been lately incloſed from a rabbit-warren, called Tilgate Foreſt, near Crawley in Suſſex, which was denſhired, and one crop of oats taken from it; but the crop was ſo indifferent, that

that the land was thought not to be worth the expence of cultivation, and, on that account, was again thrown open to the warren, and fed upon by the rabbits for two years. In October, 1796, it was again incloſed and ploughed up. It lay fallow till the middle of March, 1797; it was then harrowed, and in a few days afterwards croſs-ploughed. It remained in that ſtate till the firſt week in April, when it was again harrowed, and in a few days afterwards ploughed a third time; and in about ten days more, it was harrowed a third time, and laid up in ridges for the reception of dung. Twelve cart-loads of very indifferent fold yard dung (not worth more than two ſhillings per load), were then laid upon it; and before the 25th of April twenty buſhels per acre of potatoes, of a mixed kind, were planted upon it. In the month of June the land was once hoed, and the potatoes earthed up.—In October the potatoes were taken up by the plough, and produced rather more than two hundred and

fifty buſhels per acre. This crop was applied as follows:

Feeding one cow, from the 1ſt of December, 1797, to the 15th of March, 1798, when the cow was killed, for the uſe of William Seaton's family; ſhe was not worth more than £.8 when put up to fatten, but fattened remarkably kindly, and when killed was well worth £.20. It alſo ſupported well eight ſtore pigs of four months old, one two-year old bull, ſixteen yearly calves, one cow and calf, and three milch cows (who ate at leaſt half a buſhel each per day), from the 1ſt of November to the 1ſt of April, and three heifers in calf from the 13th of February to the 10th of April. The remaining two hundred and eighty buſhels were kept for ſeed, and planted upon fourteen acres of warren land, *without dung* (of which an account will be given to the Society next year). The expence of raiſing, and the application of this crop on the ſix acres of land, are as follow.

Expences.	£.	s.	d.	*Value of Produce.*	£.	s.	d.
Three ploughings, at 3s. per acre each time, the ground being light	2	14	0	Fatting one cow 105 days, at leaſt 2 buſhels per day, well worth	10	10	0
Three harrowings, at 1s. per acre	0	18	0	*N. B.* She improved 12l. at leaſt			
Ridging up and covering the potatoes, 4s. per acre	1	4	0	Feeding 8 ſtore-pigs 21 weeks, at 1s. per week each	8	8	0
Dung, 12 cart-loads per acre, at 2s. each	7	4	0	Ditto one 2-years old bull, at 3s. per week	3	3	0
Carting and ſpreading, 1s. per acre	3	12	0	Ditto 16 yearly calves, at 1s. 6d. each per week	25	4	0
Potatoes, 80 buſhels per acre, at 1s.	6	0	0	Ditto 1 cow and calf, at 3s. 6d. per week	3	13	6
Cutting potatoes, 1d. per buſhel	0	10	0	Ditto 3 heifers in calf, at 3s. per week each	3	18	0
Setting, 2s. per acre	0	12	0	226 buſhels given to three milch-cows in 151 days, being half a buſhel per day each, at 1s. per buſhel	11	6	0
Hoeing, 2s. per acre	0	12	0				
Earthing-up, 2s. per acre	0	12	0				
Taking up and ſecuring, 1s. per acre	6	0	0				
Rent and Taxes, 6s. per acre	1	16	0	280 buſhels reſerved for ſeed	14	0	0
	£.31	14	0		£.79	16	6

I, THE above-named William Seaton, do hereby certify and declare, that the facts above ſtated are, to the beſt of my knowledge and belief, juſt and true; as witneſs my hand, this 8th day of November, 1798.

WILLIAM SEATON.

I, JAMES BUNN, of Staplefield Place, in the county of Suſſex, do certify, that I am well acquainted with the above William Seaton, that he is a man of veracity, and that I verily believe the account above ſtated by him to be true; as witneſs my hand, this 8th day of November, 1798.

JAMES BUNN.

I, WILLIAM LAMBE, of the Middle-Temple, London, Eſq. do hereby certify, that the above-named William Seaton is tenant to me of the land above-mentioned; that the facts above ſtated were by him reduced into writing in my preſence,

ſence, and upon the ſpot; and that, upon inſpection and enquiry, I verily believe the ſame to be true; as witneſs my hand, this 10th day of November, 1798.

WILLIAM LAMBE.

No. 4, Pump-Court, Temple.

Mr. MORE.

The GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS, at the option of the Candidate, being the firſt Premium offered for IMPROVING LAND LYING WASTE OR UNCULTIVATED, was this Seſſion adjudged to Mr. ROBERT BELL, of Huntshill, near Jedburgh, North Britain; but Mr. Bell dying before the diſtribution of the Rewards, his Son and Heir, made choice of the SILVER MEDAL and TWENTY GUINEAS.

SIR,

I ADDRESS this letter from the borders of Scotland, where ancient contention in the rivalry of arms has given place to a ſpirit of emulation in the arts of peace. The animoſity of our anceſtors, which ſo frequently wrapped this part of our happy Iſle in the flames and deſtruction of war, has ſubſided: induſtry, mutual eſteem, and reciprocal good offices, have ſucceeded; and the ſheep crook and fertilizing plough

are

are the only implements which occupy the hands and attention of our proſperous community. Thoſe improvements in the Arts which were firſt introduced into the Siſter-Kingdom are ſucceſsfully practiſed here; and ſuch in particular as are connected with the rural economy have been already carried to a great degree of perfection. Their further progreſs is alſo encouraged by praiſe-worthy, patriotic inſtitutions; though by none of ſuch great and extenſive utility as that of the Society for the encouragement of Arts, Manufactures, and Commerce.

Having ſome months ago ſeen the liſt of premiums offered by this laudable Inſtitution, my attention was naturally directed to that claſs of them intended for the encouragement of agriculture. I had farmed to a conſiderable extent for more than thirty years; and having acquired experience in the cultivation of land, it was impoſſible I ſhould overlook a plan which ſeemed ſo eminently calculated to promote the improvement of this uſeful art. My attention once

once excited, I reſolved to contribute my mite in furtherance of the patriotic views of the Society, by giving an account of the improvement of an extenſive farm, containing a large portion of land lying waſte and uncultivated, in which I have been engaged for theſe eight years paſt.

Previous to commencing this intended labour, however, in compliance with the direction contained in the publiſhed notice, I procured and carefully read over the laſt Volume of the Society's Tranſactions. The peruſal of this work could not fail to inſpire me with a juſt reſpect and eſteem for ſo honourable and uſeful a Society. I have paid every attention to the ſpirit of the premium offered for the improvement of waſte land; I truſt that I have not ſo far miſunderſtood it, as to be liable to be accuſed in the paper which accompanies this letter, of too great a degree of conciſeneſs on the one hand, or of unneceſſary prolixity on the other. The lateneſs of the arrival of this Volume greatly retarded the commencement

mencement of the account of my improvements; ſo that I have much to regret on account of the ſhortneſs of the period which I have had for its relation.

In giving an account of the mode I employed in the improvement of waſte and unproductive ſoils, I have ſtudied the utmoſt plainneſs and preciſion. I ſhall leave it to ſpeak for itſelf, when I have previouſly informed the Society that the want of minute accuracy, obſervable in different parts of the paper, is to be attributed to the circumſtance of my having no intention of publiſhing an account of my improvements, until the period when I firſt noticed their premium. While I mention this, however, I muſt be permitted to declare that I have ſtudied accuracy on every eſſential point of the ſubject; and that, in the accounts of money expended on the improvements, I have as ſtudiouſly avoided error: if I have fallen into any in this part of the account, it is in the moderation of the ſtatement of the charges.

The

The paper is accompanied by a certificate from a Gentleman of eminence in literature; and if farther atteſtation were neceſſary, my improvements are of ſo prominent a nature as to procure it from numerous reſpectable characters. I humbly therefore offer myſelf a candidate for the approbation of the Society. If I ſhall be honoured with ſucceſs, and if the account of my improvements cauſes the melioration of any of the many thouſand acres of waſte land throughout the iſland, I ſhall have obtained the utmoſt object of my ambition.

With warmeſt wiſhes for the ſucceſs of the patriotic views of the Society,

I am, SIR,

Your moſt humble Servant,

ROBERT BELL.

Huntshill, near Jedburg, North Britain.
Dec. 3, 1798.

Mr. MORE.

An

An Account of the Improvements upon an extenſive Farm, containing a large portion of Land lying waſte and uncultivated.

IN the year 1790 I took a leaſe of an eſtate of about eleven hundred acres, ſituated to the north of the weſtern extremity of the Cheviot hills. It had been recently purchaſed by a Gentleman of great profeſſional eminence, who was well acquainted with the great and laſting advantages that flow from judicious improvement: it is not to be wondered at therefore, that the learned proprietor was not contented with allowing his lands to remain in a ſtate of comparative barrenneſs, under a ſyſtem of agriculture which had hardly emerged from a ſtate of ancient ignorance; he reſolved that plenty ſhould occupy the place of long-exiſting ſterility, and let his eſtate to me upon an improving leaſe.

At the period when this leaſe was taken, the eſtate was divided into four farms: the leaſe of the principal farmer was bought

bought up by the landlord, and I entered into the poſſeſſion of this part of the grounds at the period already mentioned. Two ſmaller farms came into my hands, the one of them one year, and the other four years afterward. The leaſe of the remaining farm expired at Whitſunday 1798; but by the bankruptcy of the farmer, it has been in my occupation ſince the ſame term of 1794.

Such being the ſtate of the leaſes on the eſtate, my rent was of a progreſſive nature. When I entered into the poſſeſſion of the firſt farm, I paid £.270; and at the expiration of the leaſe of the ſecond ſmall farm, my rent was advanced to £.297. It was at this period that I entered on the farm, the occupier of which had become inſolvent: I continued to pay his rent until Whitſunday 1798, the time at which it would have regularly fallen into my poſſeſſion. At this term my rent roſe to £.550, at which ſum it continues ſtationary until the expiration of the firſt twenty-one years, when it

it riſes to £.700 for the remaining period of the leaſe.

This progreſſive mode of affixing the rent was conſidered equally advantageous to both landlord and farmer: the former was benefited by getting an increaſed rent upon the lands which were firſt occupied, by the augmentation of his rental, in a ſhort period, from £.312 to £.550, and in receiving, beſides the great emoluments ariſing from plantations, a return of ſeven per cent. during the laſt years of the leaſe. The advantage to the occupier of the lands aroſe from the circumſtance, that as his improvements extended, the ſoils were more able to afford an additional rent.

The eſtate was in ſo wretched a ſituation, that this increaſe of rent could not be produced but at the expence of great ſums laid out upon the improvement of the land. That I might be indemnified therefore for this neceſſary expenditure, the term of the leaſe was made forty years; and at the expiration of twenty-one, the option of two lives

was

was in the choice of the farmer. The landlord, ſtill further to encourage the improvement of his eſtate, bound himſelf to advance £.800, in ſums of £.200, every ſix months, to the farmer, to be expended upon the lands; and to give about an equal ſum for the erection of a good farm-houſe and farm buildings. The farmer was alſo allowed a power to ſub-let the grounds for any period, not exceeding that of his tenure of the eſtate.

In conſideration of theſe advantages, I bound myſelf to manure the whole lands, and to bring them into a ſtate fit for producing corn; except a portion of them, which was in a moſſy, boggy condition. The draining of this moſs was, however, enjoined, as well as the incloſing of the eſtate. I likewiſe obliged myſelf to add about £.300 in carriage and other labour to the ſum given for the buildings, and to pay five per cent. for £.400 of this money advanced by the landlord.

Theſe are the principal features of my leaſe, which I have thought it neceſſary to particularize

particularize in this place; they beſpeak the moſt liberal views in the enlightened proprietor, and are deſerving attention from their being eminently calculated to excite the exertions of ſkill and induſtry in the improvement of waſte and unproductive ſoils.

In commencing the improvement of my farm, the firſt object that demanded attention was to ſhelter the lands in ſo high and expoſed a ſituation. The ſurface of the eſtate is a riſing ground, ſloping chiefly to the ſouth, and in a leſs degree to the north: the greateſt and beſt part of the land is contained in the ſouthern ſlope, at the bottom of which is the moſs, formerly noticed. It is ſheltered on the ſouth by an oppoſite higher ground; ſo that, as the eſtate is of a pretty regular ſquare form, there were only three ſides upon which ſhelter was required.

A ſmall ſpace upon the eaſtern extremity of the eſtate, where it was not thought proper to plant, was fenced with a double ditch and hedge; but around all the remaining expoſed border, a plantation of Scotch firs,

firs, about a hundred feet in breadth, was made. This plantation was incloſed with turf dikes, calculated to protect the plants for many years; and a ſimilar plantation, extending from one extremity of the eſtate to the other, was carried along the brow of the hill in a waving line, to ſhelter the grounds on each ſide below. The plants are making rapid progreſs towards maturity, and will amply reward the proprietor for his expences of planting.

Theſe plantations were calculated to afford a general ſhelter; but over a wide range of ſurface more immediate protection was neceſſary. Incloſing is every where highly advantageous and proper, and I cheerfully fulfilled my obligation of ſubdividing the lands: the mode of incloſing which, of all others, recommended itſelf for adoption, was that of ditch and hedge.

There were no incloſures upon the grounds, except a few bad hedges in the neighbourhood of the manſion-houſe, which is ſituated upon the north ſide of the

the eſtate: the incloſures upon this part of it were completed, and ten ſquare fields, containing about an hundred acres of land, were formed. I expended a ſmall ſum of money in manuring a part of theſe incloſures, and ſub-let them, upon a ſhort leaſe, to a Gentleman who, though previouſly unacquainted with agricultural purſuits, has nevertheleſs ſucceſsfully improved his farm after the example ſet him in the improvement of the other parts of the eſtate.

The lands upon the ſouth ſide of the plantation running along the high ground, were all ſubdivided into regular incloſures in the courſe of the winters 1790 and 1794: the fields vary in ſize according to the nature of the ſurface, but the general quantity of ground they contain is about twenty acres. The hedges are all run in ſtrait lines, and all the incloſures are regular ſquares, except thoſe which are bounded by the plantations, by the double ditch and hedge on the eaſt border of the eſtate, or by the moſs at the bottom of the hill. The

thorns have advanced rapidly in their growth, and many of the hedges are already perfect fences.

This rapidity of growth is to be aſcribed to the great attention which was paid to the pulverization of the ſoil for a conſiderable depth; and to the manuring it with lime and rich ſtable-yard dung, previous to the planting of the thorns. This effect has alſo ariſen from the after-care which has been beſtowed upon the plants in keeping them free from weeds, properly pruned, and their roots always covered with earth: for theſe purpoſes a hedger is kept upon the eſtate, at the mutual expence of the landlord and farmer; and when he requires aſſiſtance, I pay labourers to work under his direction.

Beſides this care of the plants, however, much attention alſo is paid to the protection of the hedges from the injuries they are liable to ſuſtain from the ſheep grazed in the fields. The ditch affords a ſufficient barrier on one ſide; but on the expoſed ſide of

of the hedge there is a neceſſity of running a paling of three bars at the diſtance of a foot from the thorns: the wood for this paling is given by the proprietor from a plantation of Scotch firs upon the eſtate; it is erected at my expence, and there is ſometimes a neceſſity of renewing it before the thorns have arrived at ſuch a degree of ſtrength as to be no longer obnoxious to injury.

It is worthy of notice that thoſe thorns which were planted the earlieſt in the ſeaſon have every where thriven the beſt.

I ſhall not unneceſſarily add to the length of this paper, by deſcribing the particular mode of conſtructing my ditch and hedge; I ſhall only ſtate that I have made five thouſand ſix hundred and forty-three roods (each rood containing ſix yards) of this kind of fence; and that this quantity of incloſing, together with the expence of protecting the hedges, has coſt me the ſum of five hundred and ſixty-four pounds.

Having given this account of the incloſing of the principal part of the eſtate, we are prepared to enter upon the diſcuſſion of the next ſubject which claims attention previous to the account of the improvements; viz. the ſtate of the lands and mode of occupation at the time when I entered into poſſeſſion.

Within the laſt fifty years the agriculture of Scotland has undergone rapid and extenſive improvement: the antiquated and unproductive ſyſtem of our forefathers has given place to the principles of agriculture which have flouriſhed and been perfected in many parts of the ſiſter kingdom; and in this particular county there are few diſtricts over which improvement has not extended its beneficial influence. In the number of theſe diſtricts however, was ſituated the eſtate, the improvements upon which make the ſubject of this communication to the honorable Society for the Encouragement of Arts, Manufactures, and Commerce: here Prejudice had fixed his dominion; and after

after the ancient mode of huſbandry, the ſoils were divided into what was termed *in-field* and *out-field* land, and into moor land, meadow, and bog.

The *in-field* land was that part of the eſtate which conſiſted of the richeſt ſoil, and in the preſent inſtance amounted to about three hundred and thirty acres. It was conſidered worth a rent of ten ſhillings an acre, and was managed in the following manner. The land was ſummer-fallowed, cleaned of weeds, and ſown with barley or oats, and ſometimes with wheat. The farmers produced, however, very ſmall quantities of the laſt grain; and their eſtabliſhed mode of managing this kind of ſoil was to take four or five crops after fallow, and then to repeat the ſame unproductive ſyſtem of fallowing and hard cropping: they raiſed very ſmall quantities of turnep, and theſe too only during the laſt years of their occupation of the grounds.

The *out-field* land was of a poorer quality; a part of it was valued at five ſhil-

lings, but the greater proportion of it was only rated at three ſhillings per acre. The quantity of this ſoil was about three hundred and twenty-five acres; more than two parts of it were always in a ſtate of natural graſs, and the remainder was cropped with oats.

In order to bring this land into a ſtate fit for producing corn, they folded a portion of it with ſheep, and ploughed it up in the proper ſeaſon for oats. They renewed this crop for four or five years, until the land was ſo over-run with couch-graſs and other noxious weeds, which poſſeſs a barren worn-out ſoil, that it was incapable of producing even the moſt ſcanty returns; it was therefore allowed to remain in this waſte impoveriſhed ſtate, until it was again folded in rotation: the vegetation of the weed graſs and other weeds produced a barren herbage, and the land was paſtured with ſheep.

The ſheep were grazed in common, upon this out-field land, and upon the moor land,

land, which compoſed conſiderably more than a third part of a eſtate: about a hundred acres of this ſoil were woodland; and that part of which was in the occupation of the farmers, and amounted to more than three hundred acres, was not eſtimated at a greater rent than one ſhilling per acre. It required one acre of the out-field, and four of the latter deſcription of land, to maintain one ſheep throughout the year, and that too in the pooreſt condition. The ſheep were always ſmall, and never could be fed fat upon the paſture; the lambs produced from the ewes were equally bad, and at an average were never ſold at above five ſhillings per head.

The produce throughout their farms may readily be conceived to have been of the pooreſt nature, when it is known that ſeveral of the farmers were unable to pay the ſmall rents they held them at, became inſolvent, and were obliged to give up their leaſes to the landlord. It is indeed a ſubject of wonder how they were able to diſcharge the moſt

moderate rents; for, with the additional information that the meadow and moſs land was adequate to the maintenance of a few black cattle only, the above relation is a faithful picture of the wretched means they employed to draw them from the lands. By this mode of occupation it muſt appear how great a proportion of their farms lay in an impoveriſhed waſte ſtate at the time when I rented the eſtate: the beſt ſoils produced very poor crops, and the degree of fertility of the out-field land has been already noticed. A great proportion of this kind of ſoil was lying waſte in a ſtate of natural graſs; and there was likewiſe a conſiderable quantity of it which had never been ſubjected to the operation of the plough. Upon this portion of land, furze, broom, heath, and ling, were the common productions: the moor, meadow, and moſs land, were in a ſtate of nature; nothing had been attempted to meliorate them.

In ſuch a ſituation, where ſo much was to be done, and where every ſpot of land

was

was unproductive or waſte, general improvement was an arduous undertaking: I had, however a clear perception of the advantages that would reſult from my plan of improvements, and reſolved to execute them with the neceſſary ſpirit and perſeverance. How far this plan has ſucceeded will be afterwards ſeen; but before we direct our attention to the account of the improvements, it is proper that I ſhould ſtate the nature of the ſoils which have been the ſubject of melioration, and premiſe a few obſervations upon the labour requiſite to the carrying on my operations.

The ſoils throughout the eſtate differ greatly in quality, though very little in kind, except in the moor and moſs land: they vary from a dark, heavy, loamy clay, to a light ſoil of the ſame nature: the ſubſtratum is a free ſtone rock; the ſoil of the moor land is a few inches of black mooriſh earth, upon a ſtratum of clay; that of the moſs is a deep peat earth. This difference of ſoils did not prevent me from adhering to a regular

a regular plan of incloſure, as I was convinced that improvement would render each ſoil capable of the ſame mode of culture, and hence that variations of ſoil included in the ſame field would not be productive of inconvenience.

Labour is a part of the expence in the improvement of waſte or unproductive ſoils, which in every ſituation muſt prove conſiderable: the land is incapable of maintaining the quantity of ſtock that is neceſſary: foreign aſſiſtance is required; and the improvements are executed at great additional expence.

In carrying on the improvement of my farm, I was much aſſiſted by labour, ſupplied from two other farms, which I poſſeſſed at ſome miles diſtance. By means of theſe I was always enabled to keep ſix draughts upon the improving farm, and frequently ten during the ſummer. The ploughs and carts are drawn by two horſes only, and the ploughmen rank among the moſt expert in the kingdom: the plough which

which is in common uſe, throughout all the improved diſtricts of Scotland, is Small's chain-plough; an engraving of which is given in different agricultural publications. I uſe it without the chain, and can give my teſtimony in favour of the general utility of this eſteemed plough.

The manual labour always required a number of labourers, beſides thoſe employed in ploughing, carting, aud harrowing: in eſtimating the expence of the latter operations, I have made full allowance for the advantageous circumſtances under which they were executed.

When I entered upon the improvement of my farm, it was my object to complete it in thoſe fields which contained the greateſt proportion of good ſoil. The grounds which were under cultivation were improved at leſs expence of labour than the uncultivated lands; but the only difference in the improvement of the various ſoils, aroſe from the length of time neceſſary to the pulverization of the waſte and moor land,

land. My intention, in every ſituation, was to bring the ſoils into a ſtate of fine tilth, and thus render them fit for the reception of manure, and a crop of turnep.

The ſurface of the lands which had been under cultivation, prevented many great irregularities, wet marſhy places, and numerous land-ſtones collected in ſeveral parts into heaps. Many of theſe land ſtones were of great ſize, and could not be carried off the grounds: for theſe, ſtone pits ſufficiently deep to admit of their being covered with fourteen or fifteen inches of mould, were dug; and, as a proper precaution, the pits, when there was a declivity, were ſunk at the upper ſide of the ſtone. When theſe ſtones had thus been removed, and when the wet parts had been ſucceſsfully drained with covered drains, the cultivated grounds were ploughed in the beginning of winter; and by the repetition of this operation, with the aſſiſtance of the ſpade, every hurtful inequality of the ſurface was levelled.

The

The quantity of labour requiſite to the the pulverization of the ſoil varied according to the nature of the ground: that portion of the cultivated ſoils which was managed as in-field land, required three ploughings; but the part of them which came under the denomination of out-field, demanded the quantity of labour which was beſtowed upon the ſame deſcription of land, lying waſte in graſs, after it had been cropped with oats.

Upon the improvement of this part of my farm I ſhall not be more particular, as the other parts of the proceſs will be comprehended under the account of that of the waſte land. I have, however, placed amongſt the tables of expenditure, one to ſhew the expence attendant upon the melioration of the beſt ſoils.

The improvement of the proper ſubject of this paper, the waſte and moor land, comes now under review; and that I may avoid confuſion in the account of this proceſs, I ſhall divide the grounds into two kinds;

kinds; viz. into that portion of out-field land which was exhauſted and lying in a ſtate of natural graſs; and into that which had never been ſubjected to the operation of the plough, and was over-run with furze, broom, heath, and ling. In detailing the improvement of the laſt ſpecies of waſte land, I ſhall comprehend under the ſame head that of the wet marſhy ground and moor land.

In effecting the melioration of the firſt deſcription of waſte land, the preliminary ſteps of land-draining the wet places, and of removing the land-ſtones which obſtructed the progreſs of the plough, were executed.* The laſt operation was peculiarly neceſſary; for beſides the numerous land-ſtones diffuſed over the general ſurface of the grounds, there were great collections of them upon balks, which had been formed by the ſlovenly huſbandry of ancient farmers

* I have this ſeaſon completed the improvement of a field which contained an aſtoniſhing quantity of land-ſtones. In this incloſure there are the remains of what

farmers on the eſtate: theſe balks occured over all the lands which were or had been under cultivation.

On the removal of every material obſtruction, the land was ploughed with a common furrow in the month of November; and about the end of the following ſpring it was ſown thick with oats. The produce of this crop was always of the pooreſt nature, and did not make a return of three times the quantity of the ſeed: it however indemnified me for the labour which had been beſtowed upon the ground; and the cropping anſwered the purpoſe for which it had been employed.

When I commenced the improvement of this deſcription of land, I fallowed and wrought it for two years: I ſoon, however, found the error of this practice, and the great expence

is believed to have been a Daniſh encampment; and, upon an adjoining property, there are two out-poſts at a ſmall diſtance. I have completed the filling up of the outer ditch, which time had not perfected, and the peaceful ploughſhare now paſſes over that ſpot where erſt embattled hoſts poured forth terror and deſtruction.

expence of labour attendant upon the adoption of it. The ſoil was choaked with couch-graſs and other noxious roots; and upon lying for even a few weeks, eſpecially in wet weather, the land became nearly as much filled with graſs as when the ſward was firſt broken up. To remedy this inconvenience, I firſt thought of ſowing the ground thick with oats: the effect has anſwered my expectation, for by the growth of the oats the couch graſs is prevented in a great meaſure from ſpringing up, the ſoil is looſened, and much leſs labour is requiſite to its pulverization.

The oats having been removed, the land was again ploughed in the end of autumn, and expoſed to the action of the weather and temperature of the winter ſeaſon in the ſtate of a rough furrow: it was croſs-ploughed in the beginning of April, and afterwards braked* and harrowed. About the

* This operation is performed by an implement reſembling in every reſpect a harrow, except that it is larger, heavier, and has longer tines.

end of the ſame month it was again ploughed, braked, and harrowed; and in May the ploughing and harrowing were repeated. In the courſe of this labour it was ſometimes neceſſary to paſs a heavy roller over the land, in order to break down the firmer clods.

Upon the completion of the laſt harrowings the roots of the couch-graſs were carefully collected and burnt: the land-ſtones were removed off the grounds as they were turned up by the plough; and by means of this implement and the ſpade, every hurtful inequality of the ſurface was deſtroyed.

When this labour had been beſtowed, the ſoil was brought into a ſtate of ſufficient fineneſs for the application of manure. Before I proceed to give an account of this part of the ſubject, however, I ſhall previouſly detail the mode of tillage I employed to bring the ſecond deſcription of waſte land into a ſimilar ſituation.

The furze and broom having been removed off the ground, the draining of the

wet places completed, and the larger land-ſtones carried off, the land was ploughed in November.* The furrow was made about four inches in depth, and allowed to remain in the coarſe ſtate in which it had been formed by the plough throughout the winter: the land was croſs-ploughed in May following, and afterwards braked and harrowed. It was again ploughed, braked, and harrowed, in July or Auguſt; and after the completion of the laſt part of the labour, it was ploughed into ridges of nine or twelve feet in breadth. The furrows were well cleaned out by the plough, to prevent the rain water from ſtagnating upon the lands; and they were again expoſed to the influence of the winter's froſt.

The furrows were filled up by the plough about the end of the ſucceeding ſpring, and the land was again croſs-ploughed and harrowed. After this harrowing, the roots of of

* The broom was ſold for fuel: the price received for it, defrayed the expence of its removal, as well as that of the furze.

of the ling, and other coarſe graſſes which had not periſhed during the eighteen months the land had lain in fallow, were collected into ſmall heaps and burnt into aſhes. Upon this incineration the land was for the laſt time ploughed and harrowed; and thoſe roots which had eſcaped obſervation were deſtroyed by a ſecond burning.

In the courſe of the labour beſtowed upon the grounds, the land-ſtones were carted off the field as they were brought under obſervation, and every injurious inequality of the ſurface was levelled. The land was therefore, by this proceſs of culture, freed from every foreign hurtful ſubſtance, and the ſoil was perfectly pulveriſed and rendered fit for its combination with manure.

When I had brought the lands into this ſtate of fine tilth, another more expenſive part of the proceſs of improvement followed; viz. the manuring of ſoils, waſted and exhauſted of animal and vegetable matter.

The manure which forcibly recommended itſelf in ſuch a ſituation, was lime: dung, though in a leſs degree, was alſo neceſſary and eſſential to the melioration of ſoils lying in ſuch a condition. I was ſituated at a great diſtance from the former kind of manure, but nevertheleſs reſolved to uſe it in a quantity adequate to the purpoſe for which it was employed; convinced that too ſtrict an economy in this inſtance would be productive of certain loſs: I had it in my power to command a ſufficient quantity of dung, and raiſed in the manner afterwards deſcribed.

In the application of theſe manures the quantity was regulated by an attention to the nature of the ſoils; as theſe varied from a degree of richneſs to poverty, the lime and dung were applied in quantities adequate to their melioration. The extent of their application will be detailed in the tables of expenditure.

The lime was laid upon the lands about the end of May, and immediately after its application

application they were ridged into drills of twenty-ſix inches for turnep: the dung was now laid on, and being ploughed down, the turnep ſeed was ſown upon the hot furrow.

Such is the method I have practiſed in improving my farm: its excellence and ſucceſs will beſt be ſhewn by introducing in this place, an account of the produce ariſing from the increaſed fertility of the ſoils.

The turneps have always proved an excellent crop, even upon the moſt clayey ſoils: they are eaten upon the ground by ſheep, properly folded with nets; except a ſmall proportion of them, which is given to black cattle. A very ſmall quantity of them, however, has been uſed in this manner, as the firſt method of conſuming them is highly advantageous to every kind of ſoil, more particularly to lands recently improved. The profit upon the crop has varied with the ſtate of the market for fat ſtock; but in general its abſolute value has not been leſs than £.3: 10ſ. per acre.

When the turneps are eaten off, the lands are ploughed in the proper ſeaſon for a crop of barley; and as it is my principal object in the improvement of my farm to lay the grounds down to paſture as ſpeedily as poſſible, I ſow along with the barley the following quantities of graſs ſeeds: of broad clover, twelve pounds; white clover, four pounds; rib graſs, two pounds; and of the beſt rye graſs, one buſhel.

The crops of barley have proved equally good as that of the turnep; and in general, each acre has produced about five quarters of grain.

The graſs ſeeds have always anſwered my moſt ſanguine expectations: the crop is never cut for hay, excepting only a ſmall quantity of it, which is required for a part of the ſtock upon the farm. It is paſtured by ewes and lambs; and to ſhew the value of the graſs, I ſhall give an account of the manner in which it is grazed.

In September or October I purchaſe about five hundred ewes, of the Cheviot breed, which

which are ſold by the ſtock farmer under the denomination of draught ewes. Theſe ewes are croſſed about the middle of the latter month with tups of the Diſhly breed, and are paſtured through the winter upon the moor and waſte land, yet unimproved, and upon a ſimilar paſture of one of the farms already mentioned. They begin to drop lamb about the firſt of April, and are then put into the graſs fields: theſe are never grazed after the firſt of January, ſo that when the ewes are put upon the graſs it is always a luxuriant paſture: it feeds upon an average four ewes and lambs per acre.

The lambs are ſold fat in the months of June or July, and in general bring 12s. 6d. per head. The ewes are continued on the paſture until the end of October, when they are either ſold for an increaſed price of five ſhillings each, or, as is more generally my practice, put upon turnep to be completely fattened. Upon the removal of the ewes, the graſs is eaten by young black cattle, and other ſtock upon the farm;

until the end of December. They are generally benefited by this paſture; and the advantage it is of to them, fully compenſates for the maintenance of the ewes throughout the winter. It appears therefore, from this ſtatement, that £.3: 10ſ. is the profit upon each acre of graſs.

The mode of paſturing is followed on the ſucceeding year: but having found that new graſs is greatly preferable for feeding lambs, I plough up the graſs fields in the third year, and ſow them with oats; which generally have been of ſuch a quality as to produce ſix quarters per acre.

The oats are followed by a crop of wheat, if dung is plentiful, but more frequently by another crop of oats or one of peas. This pulſe and the wheat have, upon an average, been produced in the quantity of twenty-nine buſhels per acre; and in a field which was laſt year ſown with this grain, and which contained ſeveral acres of moor land, the crop was moſt luxuriant upon this formerly barren heath.

This

This plan of cropping is varied according to circumſtances; but my fixed mode of management is to take alternately a green and a white crop; and never, after breaking up the graſs, to ſow more than two crops before the land is again prepared for turnep. When the turneps are ſown, the land is again manured with the original quantity of dung, and is again laid down to paſture with a barley crop.

It appears therefore that every attention is paid to avoid heavy cropping; and it is not leſs evident that, by the proſecution of this plan of management, large additions of animal and vegetable matter will daily increaſe the richneſs and fertility of the ſoils.

Having now detailed the mode of improving the arable lands, and given an account of the produce ariſing from the melioration of the ſoils, I ſhall, before I ſtate the expence of the improvement, conciſely relate the ſteps which have been taken for increaſing the value of the moſs land.

When

When I took the leaſe of my farm, this part of it was in the ſtate of a wet and unproductive bog. It was only adequate to the ſupport of a few crops and young neat beaſts; and a great part of it was ſo perfectly boggy, that it was incapable of ſupporting the cattle, which grazed upon the firmer parts of it and upon an adjoining meadow.

The firſt ſtep in the improvement of ſuch land, was to carry off the ſuperabundant moiſture by draining. I had formerly recovered about thirty acres of land upon another of my farms, which was an entire marſh; and I did not deſpair of the ſucceſs of a ſimilar mode of improvement in the preſent inſtance. In attempting the melioration of the moſs land therefore, my firſt object was to run a principal drain, ſtretching from the inferior to the ſuperior part of it, where it is widely extended upon an adjoining eſtate; and to interſect it by ſmaller drains, terminating in the main conductor of the water. I accordingly had this drain completed in the ſecond year of my occupation

pation of the eſtate: it was made ſix feet deep, twelve feet wide at the top, and eight at the bottom; and ſince its formation it had been repeatedly cleaned out. The interſecting drains have not been executed, and I do not apprehend that it will be neceſſary to fulfil this part of my intention.

The ſucceſs of the principal drain has anſwered my expectations; there has been always an abundant flow of water. The moſs is in various parts converted into meadow, and there is hardly any part of it except where pits have been dug for peat, that is not pretty firm and productive of ſupport to the cattle grazed on it. The adjoining meadow is likewiſe greatly meliorated; the graſſes are much finer; and many parts of it are fit for producing corn.

The advantages attendant upon the fulfilment of a part of the plan of draining, are of the moſt promiſing nature. How far the completion of it would inſure the ſpeedy exſiccation

exſiccation of the moſs, I cannot pretend to determine. This object however ſeems more likely to be effected by another mode of draining, recently publiſhed to the world: I need hardly ſay, I mean that practiſed by Mr. Elkinton.

I have lately ſeen Mr. Johnſton's perſpicuous account of this mode of draining, and have reſolved to practiſe it in preference to my original plan. I propoſe to bore auger holes in the bottom of the principal drain immediately; and thus allow a free exit to the waters which circulate below the level of its bottom. From the nature and ſituation of the ſtrata obſerved in an unfruitful ſearch after marl, I have no heſitation in pronouncing the ſucceſs of this intended operation: I have ſtill leſs in expreſſing my hopes of converting this hitherto uſeleſs part of the eſtate into a valuable paſture-ground.

The moſs, beſides a conſiderable quantity of meadow hay, already produces ſufficient ſupport for ten cows, and twenty young

young black cattle. Theſe cattle are grazed upon the moſs through the day; and are fed with ſtraw in a court-yard during the night. The yard is always well littered with ſtraw; and as this is converted into dung, new layers of freſh ſtraw are added, until ſuch a quantity of excellent dung is formed, as is adequate to the manuring of ſixty or ſeventy acres of turnep.

Such are the improvements I made upon my farm. The expence at which they have been executed will be ſhewn by the following tables of expenditure.

I.

Average Expence of improving the beſt Soils, denominated In-field, per acre.

	£.	s.	d.
Firſt ploughing	0	5	0
Second ditto	0	5	0
Braking and harrowing	0	3	0
Third ploughing	0	5	0
Second harrowing	0	2	0
Carried over	1	0	0

	£.	s.	d.
Brought over	1	0	0
Collecting and burning the couch grass and other weeds	0	3	0
Collecting and removing the land stones*	0	7	0
One hundred and sixteen bushels of lime	4	7	0
Twenty cart-loads of dung, weighing 3 cwt.	2	0	0
First drilling for turnep	0	2	6
Second ditto	0	2	6
	£.8	2	0

II.

Average Expence of improving that description of Land termed Out-field, the greater proportion of which was lying waste in a state of natural grass, per acre.

	£.	s.	d.
First ploughing	0	6	0
Second ditto	0	5	0
Carried over	0	11	0

* In this estimation of the expence of the labour bestowed upon the land, is comprehended that of the manual assistance sometimes requisite to the levelling of the surface; and the breaking of the clods by rolling. Neither of these operations could be made distinct heads of charge. The first was very partially required; and the rolling was only necessary in the most clayey soils, and there only after a wet season. It was very seldom needed by the soils comprehended under the second table; and those referred to in the third, never demanded its assistance to their perfect pulverisation.

	£.	s.	d.
Brought over	0	11	0
Braking and harrowing	0	3	0
Third ploughing	0	5	0
Braking and harrowing	0	2	0
Fourth ploughing	0	5	0
Third harrowing	0	2	0
Collecting and burning the couch graſs and other weeds	0	5	0
Collecting and removing the land ſtones	0	14	0
One hundred and ſixteen buſhels of lime	4	7	0
Twenty cart-loads of dung, weighing 3 cwt.	2	0	0
Firſt drilling for turnep	0	2	6
Second ditto	0	2	6
	£.8	19	0

III.

Average Expence of improving the Moor Land and Waſte Out-field which had never been under cultivation, per acre.

	£.	s.	d.
Firſt ploughing	0	7	6
Second ditto	0	6	0
Braking and harrowing	0	3	0
Third ploughing	0	5	6
Braking and harrowing	0	3	0
Fourth ploughing	0	5	0
Carried over	1	10	0

	£.	s.	d.
Brought over	1	10	0
Fifth ploughing - - - - - -	0	5	0
Third harrowing - - - - - -	0	2	0
Sixth ploughing - - - - - -	0	5	0
Fourth harrowing - - - - - -	0	2	0
Collecting and burning the roots of the ling, &c.	0	3	0
Collecting and removing the land ſtones -	1	2	6
One hundred and thirty-five buſhels of lime -	5	1	6
Twenty-five cart-loads of dung, weighing 375 cwt.	2	10	0
Firſt drilling for turnep - - - - -	0	2	6
Second ditto - - - - - - -	0	2	6
£.	11	5	6

Theſe tables ſhew, as correctly as it was poſſible to do at the time of their conſtruction, the expence attendant upon the melioration of each acre of the three deſcriptions of ſoils which have been the ſubject of improvement. In ſtating the different heads of expenditure however, it was impoſſible to affix to each acre of land a certain proportion of under-draining, as the neceſſity of this operation was not only partial, but infinitely varied in different ſituations,

tions. This part of the expence of improvement, therefore, will be noticed in the general table of expenditure.

The quantity of ſoils which are already improved, amounts to four hundred and ſixty-eight acres: the portion of land which comes under each table of expenditure is not eaſily aſcertained, as improvement has wrought a wonderful ſimilarity in the appearance of the ſurface of the grounds. I have, however, examined all the improved fields with great care and attention; and have had the different quantities of each kind of ſoil meaſured with as great a degree of preciſion as it was poſſible to command. To extreme accuracy I cannot pretend; but I am certain, if there is any error, that it is of the moſt trifling nature, and wholly underſerving of notice.

Having premiſed thus much, we are prepared to enter upon the general ſtatement of the expence of the improvements which have been executed upon my farm. In

giving this ſtatement, however, it is neceſſary to obſerve that there was no poſſibility of noticing every expence connected with the plan of improvement. In the execution of this plan various ſmall ſums were required by different objects; and where the improvements were executed on ſo conſiderable a ſcale, it may eaſily be imagined that the contingent expences muſt have been conſiderable. There is, however, but little reaſon for regretting the deficiency of this part of the general table of expenditure, as an account of contingencies, beſides adding to the amount of the ſum expended, would be productive of very little uſeful information.

General Table of Money laid out upon the Improvements already executed on my Farm.

	£.	s.	d.
Incloſing and ſubdividing the lands . .	564	0	0
Farmers proportion of the labour beſtowed upon the hedges	60	0	0
Improving 274 acres of land comprehended under the firſt table of expenditure.	2229	8	0
Carried over £.	2853	8	0

	£.	s.	d.
Brought over	2853	8	0
Improving 121 acres of land comprehended under the ſecond table of expenditure, nearly fifty acres of which were lying waſte, in a ſtate of natural graſs - -	1082	19	0
Improving 73 acres of land comprehended under the third table of expenditure, 42 acres of which were moor land	823	1	6
Manuring a part of the fields around the manſion-houſe before they were ſub-let	55	0	0
Draining the wet places diſperſed throughout the lands which have been improved	30	0	0
Draining the moſs - - - - -	110	0	0
Reparing one of the farm-houſes, and erecting and repairing cottages for the accommodation of labourers employed in carrying on the improvements - -	250	0	0
	£.5204	8	6

Such is the moderate eſtimation of the ſum I have expended in executing the improvement of waſte and unproductive land. I ſhall not indulge myſelf in any obſervations on its magnitude, convinced that ſilence is here equally proper and impreſſive.

The expenditure has indeed been to a great extent; but it is alſo true that it has been productive of the moſt lucrative returns. The ſoils which were in the impo-

veriſhed condition formerly deſcribed, are greatly enriched: various parts of my farm are worth fifty ſhillings an acre; and all the improved lands, upon an average, would be cheaply rented at thirty ſhillings per acre. I indeed ſub-let a field of twenty-five acres to a ſmall farmer, a twelvemonth ago, for forty-five ſhillings an acre, which before its improvement was not, upon an average, worth more than ſeven ſhillings: he pays his rent by labour in carrying lime to the parts of the eſtate yet unimproved.

The improvements have been too encouraging in their effects to leave any heſitation about the propriety of completing them; I go on to fulfil the obligations of my leaſe. All the incloſures on the ſouth of the plantation, ſtretching along the high ground, are improved, except three; and theſe I propoſe to plough up immediately: they conſiſt of waſte and moor land, and of outfield lying waſte in a ſtate of natural graſs.

In order, likewiſe, to make the remaining part of the eſtate fit for the proceſs of improvement,

improvement, the ſubdiviſion of the grounds upon the north ſide of the plantation juſt mentioned, will be completed in the courſe of this winter. The grounds, in this part of the eſtate, are of the ſame nature as thoſe which compoſe the unimproved fields on the ſouth ſide. The improvement of all the ſoils, which have been permitted to lie in the unproductive ſtate they were in at the period of my entry into the farm, will not be completed at a leſs expence than that of the ſame deſcriptions of land referred to in the ſecond and third tables of expenditure.

It is impoſſible to fix the period when the improvement of the whole land will be completed: circumſtances may haſten or retard my operations. I calculate, however, upon an end to my expences and improvements in ſix or ſeven years: I ſhall then enjoy the fruits of much labour and exertion. The difficulties engendered by induſtry will give place to eaſe and quiet; and I ſhall have the further reward of enjoying the conſciouſneſs of having proved no unuſeful

member of ſociety, in having increaſed the fertility of a portion of the earth, in having ſupported a more numerous population, and in having augmented the value of an eſtate, in no long period of years, from three hundred and twelve to more than twelve hundred pounds per annum.

I THOMAS SOMERVILLE, Miniſter of Jedburgh, in the county of Roxburgh, do hereby certify, that I reſide near the eſtate of Hunthill: that it is conſiſtent with my knowledge, that the improvements made by Mr. Robert Bell upon the ſaid eſtate have been ſkilful, profitable, and far beyond the extent required by the Society for the Encouragement of Arts, Manufactures, and Commerce; and that the land improved correſponds to the deſcription ſpecified in Article 104 of the liſt of Premiums, inſerted in the ſixteenth Volume of their Tranſactions. But being unqualified to judge either of the expence of improvement, or the increaſed value of

of land, I wiſh to decline to give any opinion or atteſtation on that part of the ſubject; though I know no reaſon for calling in queſtion the veracity of Mr. Bell, who has been long known to me; as witneſs my hand, this third day of December, 1798,

THO. SOMERVILLE.

The ſecond Premium offered for IMPROVING LAND LYING WASTE or UNCULTIVATED, being the SILVER MEDAL and TEN GUINEAS, was this Seſſion adjudged to Mr. JOHN FOX, of Boxhill, Surrey, from whom the following Account and Certificate were received.

SIR,

OBSERVING in the Abſtract of the Premiums offered by the Society inſtituted at London, for the encouragement of Arts, Manufactures and Commerce, that under Claſs 104 a Premium is offered for improving Land lying waſte or uncultivated, I have taken the liberty to incloſe you the particulars and account of the expences in the cultivation and improvement of one hundred and ſeventy-two acres of Land which were waſte and uncultivated, at a place called Boxhill in the pariſh of Dorking, in the county of Surry; but which, in the years 1797 and 1798, I cauſed

to

to be cultivated, and which is now in a proper ſtate of cultivation; and I have ſpecified the mode by which ſuch land was cultivated.

I ſhall, Sir, eſteem it a favour, if you will have the goodneſs to ſubmit the encloſed to the Society; and ſhould my exertions be deemed worthy their attention, and they are pleaſed to think me entitled to the Premium under Claſs 104, I ſhall be happy to have been in the leaſt inſtrumental in forwarding their laudable purpoſes and views. If the Society ſhould require any further particulars relating hereto, or if any further certificates are neceſſary, as to the fact of my improvements or my perſonal attendance at any time, I ſhall be obliged to you for the favour of a line, which will be duly attended to by me.

I am, Sir,

Your obedient Servant,

JOHN FOX.

Boxhill, Dorking,
Surrey, Dec. 1, 1798.

Mr. MORE.

A

A Certificate of the Improvement of Land lying waſte at Boxhill, in the Pariſh of Dorking, in the County of Surrey, lately belonging to Sir Henry Powlett, Sir John Mildmay, of Dogsmearsfield Park, Hants, Baronet, but now belonging to Henry Peters, Eſq. of Betchworth Caſtle, Surrey, and in the occupation of me John Fox, in the Year 1797, *and an account of the Expences attending ſuch Improvement.*

THE land being a large quantity, and lying in an uncultivated ſtate on a hill called Boxhill, I proceeded on my deſign, and made choice of the north part of the ſaid hill, which conſiſted, one part in red marle, in another part chalk loam, the depth of from ten to fifteen inches. Underneath lies a chalk rock, and the only vegetable produce was a ſpungy moſs bent graſs. With this were mixed ſome coarſe half-dead graſs, which all cattle refuſed, except ſheep in the winter, when every other plant was deſtroyed, and the ground became

became bare. I began the firſt operation by paring off the ſurface to the depth of about three inches, and which, as ſoon as dry, was burned in heaps at convenient diſtances, for the benefit of ſpreading the aſhes. This was done all ſummer, from February, 1797, to October following, for different crops; firſt, from February the 11th, to the firſt day of May for oats, fifty acres; from the 1ſt of May to the 15th of July, for turneps, thirty-five acres; from the 15th of July to the latter end of October, twelve acres for wheat.

The following is the eſtimate of the expences of cultivation; and the quantity of oats ſown on the firſt fifty acres was about five buſhels per acre, and produce about ſeventy buſhels per acre. The oat-aſh I ploughed, and ſowed with wheat, about three buſhels per acre, and produce about twenty-ſix buſhels per acre. The thirty-five acres ſown with turneps were worth about two pounds per acre. In the ſpring of 1798, the ſame land I ſowed with barley, about four buſhels per

per acre; produce, about fifty bushels per acre. The twelve acres sown with wheat, 1797, from paring and burning, before any other crop, I sowed three bushels per acre; produce, about thirty bushels per acre.

The following is the estimate of the Expence and Produce of one Acre.

One acre of the fifty, sown with oats.

	£.	s.	d.		£.	s.	d.
Paring and burning, and spreading, ashes	2	4	0	Value of the Crop of Oats, per acre	9	18	0
Ploughing for oats	0	12	0	Straw	1	4	9
Seed	0	17	6		11	2	9
Harrowing	0	3	0				
Mowing	0	3	6	Expences	4	13	0
Thrashing	0	13	0				
	£.4	13	0	Balance	6	0	9

Wheat on the above fifty acres sown in in September 1797.

(One acre.)

	£.	s.	d.		£.	s.	d.
Ploughing	0	10	0	Value of the Wheat Crop per acre	7	0	0
Seed	1	1	0	Straw	1	5	0
Harrowing	0	3	0		8	5	0
Reaping	0	12	0				
Thrashing	0	10	6	Expences	2	16	0
	£.2	16	6	Balance	5	8	6

	£.	s.	d.
Ploughing for barley, per acre	0	10	0
Seed	0	15	0
Harrowing	0	3	0
Mowing	0	3	6
Thraſhing	0	12	0
	£.2	3	6
Expence of Turneps	3	7	0
	£.5	10	6

	£.	s.	d.
Value of the Crop of Barley, per acre	9	0	0
Straw	1	5	0
	10	5	0
Turneps	2	0	0
	12	5	0
Expence	5	10	6
Balance	£.6	14	6

Thirty-five acres for Turneps.

Expences for one acre.

	£.	s.	d.
Paring, burning, & ſpreading aſhes	2	4	0
Ploughing	0	10	0
Harrowing	0	3	0
Turnep ſeed	0	8	0
Hoeing	0	8	0
	£.3	7	0

	£.	s.	d.
Value of the Turnep Crop, per acre	2	0	0

The following is an eſtimate of the Expences and Produce of one Acre out of the twelve Acres of Wheat ſown.

	£.	s.	d.
For paring, and burning, and ſpreading aſhes, per acre	2	4	0
Ploughing, do.	0	10	0
Seed	1	1	0
Harrowing	0	3	0
Reaping	0	12	0
Thraſhing	0	10	6
	£5	0	6

	£.	s.	d.
Value of the Crop of Wheat, per acre	9	0	0
Straw	1	5	0
	10	5	0
Expence	5	0	6
Balance	£.5	4	6

Seventy-five acres of land cultivated, and not pared and burnt, on Boxhill Farm, early in the year 1797, on the weſt part of the ſaid hill, was covered with juniper buſhes and thorns, which no breaſt plough could touch; nor was there any turf ſufficient from which any aſhes could be collected, nor graſs, but what all cattle refuſed. In fact, this ground was worth no more than the growth of the junipers and thorns; and the ſlowneſs of the growth made it of the ſmall value of one ſhilling, per acre, *per annum*.

The following is the eſtimate of the Expence and Produce of the Crop of Oats of ſeventy-five acres, which were ſtocked, grubbed, and root-picked.

Seed four buſhels per acre.

Produce, about twenty buſhels per acre.

	£.	s.	d.		£.	s.	d.
Expence of one acre, ſtocking and cleaning	0	15	0	Value of the Crop of Oats per acre . .	2	5	6
Picking and fagotting . . .	0	8	0	Straw . .	0	10	6
Ploughing . .	0	10	0				
Seed . .	0	16	0				
Harrowing . .	0	3	0				
Carried over	2	12	0	Carried over	2	16	0

	£.	s.	d.
Brought over	2	12	0
Mowing . . .	0	2	9
Thraſhing . . .	0	3	6
	2	18	3
Value of faggots	1	8	0
	1	10	3

	£.	s.	d.
Brought over	2	16	0
Expence . .	1	10	3
Balance . .	1	5	9

The following is the eſtimate of the Expence and Produce of the Crop of Turneps and Rape ſown on the ſeventy-five acres before-mentioned.

Expence per acre.

	£.	s.	d.
Ploughing . .	0	8	0
Seed	0	1	6
Harrowing . .	0	2	0
	0	11	6

	£.	s.	d.
Value of the Crop of Turneps and Rape ſeed, per acre . . .	1	2	6
Expence . . .	0	11	6
Balance . . .	0	11	0

(The whole of which were cultivated in the year 1797, and not any part of the ſaid land before ploughed or cultivated in any manner whatever.)

The above ſeventy-five acres not having turf ſufficient to pare and burn, were not in

in a ſtate to receive a ſecond crop of corn; but there is but little doubt that from the crop of turneps and rape being fed off with ſheep, it will be in a ſtate to grow oats, and be proper to be laid down for graſs ſeed.

Acres pared and burnt	97
Acres grubbed, &c.	75
Total	172

I JOHN FOX, of Boxhill in the pariſh of Dorking, in the county of Surrey, do hereby certify to the Society inſtituted in London, for the Encouragement of Arts, Manufactures, and Commerce, that the above particulars are in every reſpect true and juſt. Given under my hand, this 30th day of November, 1798,

JOHN FOX.

WE whoſe names are hereunto ſubſcribed, the Miniſter, Churchwarden, and inhabitants of the pariſh of Dorking

Dorking aforeſaid, do hereby certify, that we believe the above particulars and account of Mr. Fox's Improvements of Land, which was waſte and uncultivated, at Box-hill, in the pariſh of Dorking, is true; as witneſs our hands, this 30th November, 1798.

SAMUEL GOODINGE, Miniſter.

EDW. ANSELL,
P. ROTHAM,
ROB. PIPER,
JOHN ATLEE,
GEO. SHEEN,
SAM. DENDY,
JOHN WILSON,
} Churchwarden and principal Inhabitants.

The following Papers were this Seſſion received in claim of the Premium offered for MAKING HAY IN WET WEATHER; but it having been communicated to the Society, that the manner of *tippling* Clover and Lucerne Hay, as deſcribed by Mr. WAKEFIELD, has been long known and practiſed in ſome of the Northern Counties, though not in uſe in the Southern parts of this Iſland, the Society voted to Mr. Wakefield their SILVER MEDAL, conſidering that the method is likely to be attended with good conſequences, if made generally known through the Kingdom.

SIR,

I HAVE ſent to the Society for the Encouragement of Arts, Manufactures, and Commerce, a truſs of Clover Hay, and a few tipples of Lucerne Hay, made or cured by a method too little practiſed, as it ſecures theſe graſſes from damage in the worſt of ſeaſons, and

and preſerves the leaves and bloſſoms perfect: when intended for ſeed, the whole is ſaved. I do not know that any experiments of this kind have yet been made on white hay. The practice is to roll the graſs up immediately after the ſcythe, into bundles or tipples, of the ſize of a ſmall barley-ſheaf; then draw out a band from one ſide (leaving it united), twiſt it as drawn out, and tie it firm round. The tipple being placed betwixt the knees, that part above the band is drawn through the hands with a twiſt, and the longeſt graſſes drawn out ſo far as to tie in a knot, which finiſhes the point of the cone, and forms the tipple. See the cut annexed.

The advantages are evident, as the rain is carried off ſimilar to the thatch of a

houſe, and the ſun and wind have ſuch acceſs as to prevent fermentation, conſequently cannot injure in any reaſonable time.

I am

Your moſt obedient ſervant,

THOMAS WAKEFIELD.

Liverpool, 27th Dec. 1798.

Mr. MORE.

SIR,

THE truſs of Clover Hay I ſent to the Society, by Mr. Wakefield's orders, is out of one of the ſtacks on Trafford Moſs, and is not ſuperior to the whole. This year I tippled about thirty-ſix ſtatute acres, and the weather was very rainy for three weeks: laſt year I tippled upwards of eighty acres, both crops, the firſt of which was out upwards of ſix weeks, in almoſt conſtant rain, and not touched until it was houſed;

houſed; except after a violent wind I ſent a man to put up what fallen tipples might be blown down. The expence of cutting and tippling is 9s. per ſtatute acre, and the people got 2s. 6d. per day by the work.

I am

Your moſt humble ſervant,

JAMES GREENHALGH.

Trafford Moſs, Dec. 28, 1798.

Mr. MORE.

LAST winter a conſiderable quantity of Clover Hay was received at Mancheſter barracks, by the Princeſs Royal's own Regiment of Light Dragoons, under the command of Col. M'Dauale, which was of excellent quality, and was grown on Trafford Moſs. It was cured by the method of tippling, by which means the leaves and bloſſoms were perfectly preſerved. The quantity I believe was upwards of ſixty tons.

W. FARMER, B. M.

Hulme Hall, near Mancheſter,
December 29, 1798.

SIR,

I HAVE duly received your letter of the 15th inſt. in which you mention that the Committee of Agriculture requeſt me to inform them reſpecting the novelty of tippling Clover in cones ſtanding on their baſes, bound at the top by bands made of the ſame clover, &c.

About fourteen or fifteen years ago I procured a huſbandman from near Ripley, in Yorkſhire, an expert turnep-hoer, who the ſame year tippled ſome clover for me, which mode of making Clover Hay I have ever ſince practiſed. The man then informed me, it was in common practice in Cleveland, and had been ſo for many years. I think it the beſt method of making Clover Hay, and, all things conſidered, much the cheapeſt; and ſome of my neighbours have adopted the practice.

I am, SIR,

Your moſt obedient ſervant,

THOMAS ECCLESTON.

Scarisbrick, Jan. 18, 1799.

Mr. MORE.

The

The SILVER MEDAL was this Seſſion voted to JOHN MIDDLETON, Eſq. for the following Obſervations on various kinds of MANURE.

SIR,

HAVING made experiments with various kinds of Manure on a farm, of which I am the owner and occupier, ſituate at Merton, in Surrey, for the purpoſe of aſcertaining the moſt appropriate dreſſing for the ſoil, which is a tenacious loam on a ſubſtratum, approaching towards yellow clay, I am induced, by the regard I feel for the ſucceſs of Britiſh Agriculture, to requeſt that you will be ſo obliging as to lay the following obſervations on the ſeveral experiments before the Society for the Encouragement of Arts, Manufactures, and Commerce, for their conſideration. I hope and believe that they will be found not altogether unworthy their attention.

1. *Peat Aſhes*, from Newbury, Berks. Of theſe aſhes I have ſpread, in various quantities, per acre, fifteen hundred buſhels, on wheat, tares, ſeeds, and meadow land, without being able to diſcern any beneficial effect from them.

2. *Coal Aſhes*, ſpread on three or four acres of graſs land, in March, 1798, produced no viſible effect at *mowing time*, nor have I *ſince* obſerved any.

3. *Wood Aſhes*, the produce of my own fires, when ſpread on the graſs in February, or early in March, I have found to be of ſome, though little ſervice.

4. *Malt Duſt*, including the duſt from the malt-kilns, I uſed for two or three years, to an extent ſufficiently great to aſcertain that the benefits produced by the uſe of it are conſiderable. It may be applied in ſuch a quantity as to inſure *one large crop*; but on meadow land, even when hay is at five pounds a ton, it only repays the prime coſt.

The quantity which I have uſually laid on, has been in the proportion of from fifty

to

to ſixty buſhels per acre. The firſt coſt of kiln-duſt is ſix-pence, and of malt-duſt eight-pence per buſhel: including the expence of carriage, and ſpreading this dreſſing on the land, it amounts to about two guineas per acre. The extra crop returned me this ſum, but without profit.

5. *Soot.* Of this Manure I ſpread eight hundred buſhels over twenty acres of wheat in one year; but I could not, from the ſubſequent appearance of the crop, diſcover whether the increaſe in quantity was equivalent to the additional expence. However, it was evidently of ſome uſe; but to what extent, would require more than bare inſpection to aſcertain. By way of compariſon, ſome of the ridges were left without ſoot; they were at harveſt ſcarcely to be diſtinguiſhed from the reſt; but where the ſoot lay in larger quantity than ordinary, as was the caſe in the places at which the loads had been ſhot from the carts, the ſuperior vegetation was very diſtinctly marked. I have, on the whole, formed the ſame opinion

nion with reſpect to this ſpecies of Manure, as I have already ſtated in regard to malt-duſt, namely, that it returns the coſt price, with very little profit.

6. *Soap-maker's Waſte.* I have tried only one load of this Manure on a few rods of ground, in four of my meadows. It has not produced the leaſt effect, although it is now three years ſince it was laid on. Soap-maker's waſte, Pot-aſh, and Barilla, are probably held in too much eſteem, as preparers of the food of plants, by philoſophical chemiſts, of whom it might be wiſhed that a little *practice* were combined with their *theoretical* ideas on the ſcience of Agriculture, that they would try their ſpecious theories by the teſt of experiment, before they publiſh them to the world.

I am further induced to conſider this kind of dreſſing for land, as of much leſs utility than is generally imagined, from having been informed by Mr. Ruſſel, jun. that his father, who is a Soap-maker of great reſpectability at Paris Garden, has uſed the waſte

waſte of his own manufactory on his farms in Eſſex and Kent (in the latter on a clay ſoil), without diſcovering that it was of any material benefit to the land; and that he has conſequently diſcontinued the uſe of it.

The experiments made by Major Valley, as reported in the Eighth Volume of Papers publiſhed by the Bath Society of Agriculture, ſeem alſo to prove that Dr. Hunter's food of plants does not anſwer *any* of the purpoſes for which it has been ſo highly extolled; but, on the contrary, that it is really *hurtful* to corn crops.

7. *Sweepings of London Streets.* I have uſed ſeveral hundred loads of this manure on graſs land, and have found it to be of conſiderable ſervice to the ſucceeding crops. I have uſually laid it in large heaps, and mixed with it a ſmall quantity of horſe dung: in this ſtate it generates a little heat, though leſs than might be wiſhed, which helps to decompoſe or rot the mixture; when thus prepared, it has been ſpread on the

the land, in the proportion of ten or twelve loads per acre.

8. *The Soil of Privies.* Within the laſt four or five years this Manure has been ſpread on my land, to the expence of about £.100; the proportion, from two to four loads per acre. The effect produced by it was *aſtoniſhing fertility*; ſo much ſo, as to induce me to be of opinion that it exceeds every other kind of Manure that can be brought into competition with it, at leaſt for the *firſt year* after it is laid on. In the ſecond, it is of ſome ſervice; but in the third year its effects very nearly or entirely ceaſe. From theſe premiſes I draw this concluſion, that, for land in good condition, the application of two loads per acre, per annum, will continue it in that ſtate for any length of time: and alſo, that land which has been much exhauſted might be reſtored by laying on four or five loads per acre; after which a repetition of two loads annually would be found ſufficient to keep it in the higheſt degree of fertility.

9. *Farm*

9. *Farm-yard Dung.* This, when it had been once turned and become about three-fourths rotten, I have uſed in the proportion of about *thirteen* or *fourteen loads* per acre, and found it much leſs effective for *one* year than *three loads* of night-ſoil. I believe that even a load and a half of ſoil would have been equal to the foregoing quantity of dung. In the *ſecond* year I could not perceive any difference between the dung and the ſoil.

In the laſt Volume of the Tranſactions of the Society, page 168, a crop of wheat, amounting to 56 buſhels per acre, is ſaid to have been raiſed by Mr. Henry Harper, of Lancaſhire; which is ſo much above the general average, that Mr. Harper was at a loſs how to account for it. I am inclined to think that the *Night-ſoil* contained in the mixture with which he dreſſed the cloſe, was the cauſe of this *wonderful effect*.

He mentions, that the quantity of Manure (conſiſting of *Night-ſoil*, Coal-aſhes, Sweepings of Streets, &c.) was eighty tons, and

and that the cloſe contains eleven acres: the proportion per acre was therefore ſomething more than ſeven tons. He does not ſay what part of this proportion was Night-ſoil, but it was probably not leſs than four tons; a quantity which, as I have before obſerved, is ſufficient of itſelf to produce one immenſe crop.

In ſhort, it appears to me that nature, following her general ſyſtem of re-production, prepares this matter in the moſt perfect manner for the purpoſe of feeding vegetables, and raiſing them to the very higheſt pitch of excellence: and it is certain, that herbage growing under theſe circumſtances is capable of fattening the *largeſt* cattle in leſs time than any other.

The importance of this kind of Manure being ſo evident, I am ſure the Society will feel, equally with me, the moſt poignant regret, when they take into their conſideration that ninety-nine parts in every hundred of this valuable article is conſtantly and moſt *abſurdly* carried, by the ſewers and drains,

drains, into the rivers, and thereby totally loſt to the purpoſes of Agriculture, for which it is ſo admirably adapted.

In Britain alone the quantity of this Manure, and of urine, which is annually thus waſted, is aſtoniſhingly great; probably not leſs than five millions of cart-loads, worth to the farmers two millions and a half, and to the community five millions of pounds ſterling per annum.

This ſubject is, I think, well entitled to the attention of the Society; and it would add much to the credit which they have already acquired by their patriotic labours, if they could deviſe the means whereby the waſte of this article might be effectually prevented.

I am, SIR,

Your very humble ſervant,

JOHN MIDDLETON.

Lambeth, 28*th Nov.* 1798.

Mr. MORE.

The

The GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS, at the option of the Candidate, was this Seſſion adjudged to MATTHEW FORSTER, Eſq. from whom the following Papers were received, and who made choice of the GOLD MEDAL.

SIR,

I BEG leave to offer my experiments and obſervations to the Society for Encouragement of Arts, Manufactures, and Commerce, for the premium of the comparative culture of Turneps, Claſs 90, having for many years paid much attention to Agriculture (particularly Turnep culture), and for fourteen years paſt have cultivated between thirty and forty acres annually, and tried many different methods of culture on that uſeful root. I hope the Society will excuſe any inaccuracy and provincial words made uſe of in my Papers.

I am,

I am, with the utmoſt reſpect, wiſhing proſperity to the Society's improvements of the chief of Arts,

Your humble Servant,

THE CANDIDATE.

Mr. MORE.

An Account of the Experiments made on a twenty-one acre Field of light ſandy loam, from four to ſix inches deep, on a ſandy ſubſtratum, to determine the comparative advantage of the Drill or Broad-caſt method in the cultivation of Turneps.

IN December, 1797, the field, being oat ſtubble, was ploughed with a deep furrow; in the latter part of April, 1798, it was harrowed with four harrows of different lengths of tines or teeth (from ten to ſix inches below the wood), giving the field four doubles. A week after, a light weed-harrow went over the field, and collected the weeds

into rows, which were carted off into a heap to make compoſt. In May the field was croſs-ploughed, with the ſame harrowing as above. In June the field was three times ploughed and harrowed as before, and twenty women hand-gathered the weeds, which were carted off to the compoſt heap.

The manure was carted from the fold-yards and ſtable dunghills into a pond, made on purpoſe to contain the fold-yard water, and the whole ſurface covered over with ſoil to prevent the fermentation from eſcaping, and aſſiſting in deſtroying the ſeed of weeds going out with the manure. Twenty cart-loads (each ſhort cart containing thirty-two Wincheſter buſhels) were laid upon each acre: the manure was ſpread upon the field, and we began to ſow the 21ſt of June: the ſeed was round white, with a ſmall mixture of red ſeed.

For many years paſt I have always ſown my turneps with a ſimple machine that fixes to the plough, and ſows the ſeed in the

the ſeam or hollow between the furrows; and a ſmall harrow fixed to the machine, harrows in the ſeed; and a plough without a machine to follow every plough with the machine, to make the diſtance two feet between the drills: if more diſtance is wanted between the drills, two ploughs may follow the machine plough, and make the diſtance three feet between the drills. The quantity of ſeed ſown is one pound per acre. I have obſerved from experience that thick ſowing is a protection againſt drought, and the plants will grow more in one week, than thin-ſown plants will do in two, as long as the plants have their nouriſhment from the ſeed, after which it is proper to hoe the firſt time.

From the 21ſt to the 28th of June, thirteen acres were ſown on two-foot drills. On the 28th eight acres were ſown; viz: four acres and a half drilled at eighteen inches; three acres and a half ſown broad-caſt, and rolled the ſame day, which I always practiſe on dry land, as it keeps the

drought out and retains the moiſture; except the land be wet, then roll when the land is dry. Before hoeing I have a plough without any mould-board, two inches broad at bottom, and a ſhare with two wings ſet to the angle of forty-five degrees, broader or narrower as the drills are in breadth, to hoe between the drills. A man with one horſe will hoe three acres per day; the hand-hoers immediately follow. The firſt time hoeing coſts 5s. 4d. per acre: after the weeds are dead, the above plough is run through between the drills a ſecond time, and the ſecond hoeing follows, which coſts 2s. 8d. per acre (hoed to one foot diſtance). After the weeds are dead, a double mould-board plough, with a man and one horſe are employed to earth up the ſoil cloſe about the turneps, ſo as not to cover the tops, which preſerves the turneps from froſts much better than thoſe ſown on the top of drills.

Feb. 28th, 1799. The fortieth part of an acre drilled at two feet diſtance, the ſame

ſame quantity on the eighteen inches drilled, the ſame quantity on the broad-caſt, were accurately ſet out by a neighbouring gentleman; the turneps drawn, and tops and roots cut off; and they were ſeparately weighed in the preſence of a magiſtrate, the curate of the pariſh, and ſeveral gentlemen; and the produce was as follows:

	lb.
One hundred and twenty-one ſquare yards, drilled at two feet diſtance, weighed	1438
One hundred and twenty-one ſquare yards, drilled at eighteen inches diſtance, weighed	827½
One hundred and twenty-one ſquare yards, broad-caſt, weighed	667½

Theſe quantities were taken from the middle of the field, where there was no perceivable difference. The broad-caſt was hoed to the ſame diſtance as the others, and as full ſtocked with plants, and as regular as the others, but ſmaller in ſize, the whole field being clear from weeds.

The great ſtorm of ſnow prevented me from weighing ſooner, and the froſt had ſpoiled part of them. I think if the ſame quantity had been weighed at the latter end

of November, 1798, they would have weighed one third more at leaſt. In my opinion the air confined between the drills after the tops meet, greatly aſſiſts the growth of the turneps, much more than in the broad-caſt way.

The two-feet drills are much the beſt all over the field: I have two other fields of turneps, one ſix acres, four of which were ſown broad-caſt; the other field eight acres, drilled: the drilled in both fields are double the quantity of the others.

The above comparative experiments are in my mind clearly deciſive in favour of drilling, as dry land ſuits the broad-caſt method; for in heavy moiſt ſoils, or thin or weak ſoils, the broad-caſt is not worth cultivating.

Remarks on the Cultivation of Turneps.

The moſt uſeful Soil for Turneps.

Rich loams, gravelly loams, ſandy loams, clayey loams, limeſtone gravel, whin gravel.

Inferior

Inferior Soils for Turneps.

Chalkey ſoils, gravelly ſoils, hazel ſoils. Theſe muſt be effectually under-drained; if not, they are not worth cultivating for Turneps.

Turneps ought never to be ſown upon ſtrong retentive clay ſoils, thin yellow ſandy ſoils, or thin white ſandy ſoils.

Preparing the before-mentioned Soils for Turneps.

The number of ploughings muſt be regulated according to the foulneſs of root-weeds, and tenacity of the ſoil, which muſt always be made as clean from weeds as poſſible, and as much pulverized as the nature of the ſoil will admit (as turnep-ſeed requires as fine ſoil as any garden ſeed). As to cleaning the land, every agriculturiſt is informed in what manner to perform that; as to plough the land, and roll ſtiff clotty ſoils frequently after harrowing is the beſt method I know of both in aſſiſting to pulverize, and to get out the root-weeds.

Manures.

The fold-yard and ſtable dung carted out into a proper place and covered over with ſoil, and turned after having laid a month or more, makes the beſt manure for Turneps I know of. I have, for many years, had good crops of Turneps by laying compoſts of ſoil and lime (in my uſing peat or black earth) upon ſandy or gravelly ſoils, ſixty cart-loads or more upon an acre. Lime is very little known as to the good qualities it produces as a manure: the ſmallneſs of the quantity laid upon an acre (as far as my obſervation has reached) has no more effect than if one cart-load of rotten dung was regularly ſpread upon an acre, owing to the different quality of lime. The richneſs of ſome lime has $\frac{1}{14}$ of calcareous earth in a cart-load; in other lime $\frac{1}{14}$ of ſand in a cart-load. What effect can two cart-loads of the latter, containing thirty-two Wincheſter buſhels per load have as a manure upon one acre? It would require

quire ten cart-loads of the latter to be laid upon an acre, to be equal to the former; the expence of which would be more than the value of an acre of good turneps. I have ſeen very good crops of turneps where three cart-loads of the former lime was laid upon an acre without any other manure. Such lime, where it can be had at a moderate expence, is a rich manure, and is found to be a great improvement when the land is laid down to graſs. As for the other manures, ſuch as night-ſoil, ſoap aſhes, &c. &c. theſe are local manures, and can be only had in quantities in large towns, &c. which only anſwers for individuals.

Sowing Turneps.

The beſt kind of turnep-ſeed I know of is the round white green top, and red for field turneps. If turneps are wanted to feed down early in autumn, begin to ſow about the 1ſt of June (if ſown ſooner, they run to ſeed before Martinmas), and continue ſowing

ſowing till the 12th of July: later ſowing ſeldom gets to a ſize worth ſtanding. One pound of well dreſſed ſeed is the quantity I always ſow upon an acre, both for drill and broad-caſt. The proper depth is two inches; if leſs covered, they are injured by drought, or waſhed bare with rain. The beſt prevention againſt the fly is thick ſowing and rolling early in the morning. I have always obſerved the rolled turneps improve much more than thoſe parts of the field which were not rolled. As to horſe-hoeing and hand-hoeing, I refer to the method uſed in the twenty-one acre field above. In my opinion, the beſt diſtance for drilling is *two feet:* if large turneps are wanted, two feet ſix inches, up to three feet: leſs than eighteen inches cannot be properly horſe-hoed, which is material to the growth of the turneps, as well as making a good clean fallow of the field.

Method

Method of Drilling.

A double mould-board plough ſhould go over the field, to form the ſoil into drills; the manure ſhould be immediately carted into the drills, and laid down in heaps, in the middle of each five drills, and women ſet to ſpread the manure with their hands, which they will do more regularly than men with forks, and with leſs coſt. As to level-drilling, I again refer to the twenty-one-acre field method.

Comparative advantage between Drill and Broad-caſt.

The advantage of drilling on good land is obvious, as the horſe-hoeing and hand-hoeing greatly aſſiſt the growth of of turneps; and when the tops meet from drill to drill, the air contained under the tops greatly aſſiſts the increaſing ſize of the turneps.

Of Drilling on inferior Soils.

The advantage in inferior ſoils, in my opinion, is ſo great, that forty years ago no turneps

turneps were ever attempted to be grown on any ſuch ſoils, when broad-caſt was the only method of cultivating turneps; at any rate a barbarous practice upon ſuch ſoils, and which ought entirely to be exploded, except in burnbating, provincially in this diſtrict calle.l paring and burning. In drilling the above ſoils, raiſed drills in thin weak ſoils nearly double the thickneſs of the ſoil; and in moiſt ſoils the land is kept in a dry ſtate, and the turnep-ſeed ſown as on a hot-bed. Beſides the great advantage of horſe-hoeing, from the long experience I have had in the cultivation of Turneps, I am entirely in favour of drilling.

To preſerve Turneps for late Spring-feeding.

I have tried many different methods, viz. ſtoring them up in a houſe, ſtacking them with ſtraw after the' tops and roots were cut off; digging holes in ſand, and covering them over; ploughing a furrow in the ſtubble, and laying them in it by the heels, and

and then ploughing another furrow upon them. The great expence and rotting of the turneps, made me give up the above methods; and after trying ſeveral more, none of them anſwered. I tried to ſtop the vegetation of the ſeed-ſtem; and in the middle of March, three years ago, I ſet two women with large knives to cut the tops of the turneps very cloſe, each woman cutting two rows at a time, going in the middle of two rows, and cutting the tops off right and left. On that day they cut one acre, which coſt 1s. 4d; the tops were laid in heaps, and carried off in baſkets, and given to the ſheep in the fold. The experiment anſwered above my expectation; the turneps were preſerved three weeks before they put out for ſeed-ſtems, which was round about where the top was cut off, and the turneps kept ſound. One night's froſt will deſtroy theſe tender ſhoots, and then they will have to make new ones again. I have continued this practice ever ſince, and have preſerved turneps to the middle

middle of May; when the ſheep never eat any of the turneps that were not cut, and very little of the ſtem in flower.

The ſoil where the turneps are cut is very little exhauſted by the roots of the turneps, which have no ſeed-ſtem to ſupport.

The ſoil is very much exhauſted where the ſeed-ſtem is ſuffered to flower, which is chiefly ſupported from the ſoil.

SIR,

WE whoſe names are hereunto ſubſcribed, do certify, that on the 28th day of February laſt, on the farm of Mr. M. Forſter, at Broomy Holme, in the pariſh of Cheſter-le-ſtreet, in the county of Durham, we viewed a crop of Turneps of twenty-one acres, or thereabouts, and that, from the ſame indifferently choſen, we meaſured off three equal portions, conſiſting of four perches each; namely,

Four drilled at two feet diſtance,
Four drilled at eighteen inches,
Four broad-caſt.

And

And after the roots and tops of the turneps were taken off, and cleaned, the produce of each portion, as above ſpecified, weighed as follows:

		Weight per acre.			
	lb.	Ton.	cwt.	qr.	lb.
Quantity drilled at 2 feet,	1438	25	13	2	8
Ditto ditto 18 inch,	827 ½	14	15	2	4
Ditto, broad-caſt	667 ½	11	18	1	16

Witneſs our hands, this 9th day of March, 1799, at Cheſter-le-ſtreet.

WILLIAM NESFIELD, one of his Majeſty's Juſtices of the Peace for the County of Durham.

ROBERT NELSON, Sub-Curate of Cheſter-le-ſtreet.

WILLIAM FEATHERSTONHAUGH.

GEORGE WARDELL.

Durham, April 5, 1799.

Mr. MORE.

In

In conſequence of the following Papers, the SILVER MEDAL was this Seſſion voted to the Rev. HENRY JEROME DE SALIS, D. D. the Candidate being precluded obtaining the GOLD MEDAL, which was the Premium offered for the CULTIVATION of PARSNEPS, for the purpoſe of feeding Cattle and Sheep, by the conditions required by the Advertiſement having not been fully complied with, owing in ſome degree to the inclemency of the Seaſon.

SIR,

I HAVE hitherto delayed my promiſed letter to you, upon the ſubject of my Parſneps, in the hope that I might be able, at one and the ſame time, to give you an account both of the quantity of land on which I have cultivated them, and of the amount and application of the produce. The froſt, however, has prevented me from taking up the roots upon more than four

four acres out of ſix, that I appropriated to parſneps. Theſe four acres are a ſtrong argillaceous loam, which from the beginning of the autumnal rains was not in a condition to bear carting. I have the ſatisfaction however to know that the froſt, though very ſevere in this place, has not hurt the roots; ſo that I have them in reſerve for my fatting ſheep, and ewes, and lambs, at the return of the open weather. The two acres and a fraction were of a ſandy loam: the crop on this land, owing to the great drought in the ſpring, was a very ſhort one. Of the application of that, however, I am able to ſpeak in part: a very fine Yorkſhire ſhort-horned heifer was ſtalled, quite lean, and fed from the beginning with parſneps and very fine clover hay. It was ten weeks laſt Saturday, (the 2d of February) that ſhe was put up: ſhe took to them immediately, and for the firſt fortnight ate about ſixty pounds per day, together with a conſiderable quantity of clover hay. I then increaſed her quantity of parſneps to about one hundred pounds daily: ſince that increaſe, ſhe has not eaten more

than five or ſix pounds of hay, and ſhe has drunk much leſs. What ſhe has continued to drink in the day is about four gallons. She is tended by a very careful and experienced feeder, who told me at the end of the firſt week, that ſhe began to thrive; and he has ever ſince continued to ſay, that in all his experience he never ſaw ſuch improvement as this food has made on her. Some of the firſt graziers of this country, perfectly ſkilled in the effects of oil-cake, have ſeparately ſeen her, and told me afterwards that oil-cake could produce no ſuch effect. She will be completely fat by Eaſter; and if ſhe is, the propoſition of the Jerſey Board of Agriculture, that a beaſt from quite lean will be rendered quite fat by parſneps in three months, will, in this inſtance, be nearly verified. Indeed, if ſhe was to be killed now, it would be verified; for ſhe is now fat.

I am, SIR,

Your obedient ſervant,

H. J. DE SALIS.

Wing, near Leighton Buzzard,
Feb, 8th, 1799.

Mr. MORE.

SIR,

THE land upon which the parſneps were cultivated, has been accurately meaſured by a regular land-ſurveyor, Mr. Long, of Fenny Stratford; and four acres and a fraction of it, which is in this pariſh, were alſo meaſured with the reſt of the pariſh, by the ſurveyors appointed for the late incloſure. I am ignorant of the forms required by the Society, to be obſerved upon theſe occaſions; but as the paper which you gave me in June laſt ſtates, that Certificates ſhould be given in on the ſecond Tueſday in February, 1799, it is now rendered impoſſible by the weather, and the extreme badneſs and danger of the roads, from obſerving that condition.

To the account given to you in my laſt letter, of my Yorkſhire ſhort-horned heifer, which has had parſneps only, with a little clover hay for her food, I am now able to add, that a butcher whoſe judgment is acknowledged throughout the country, has

this morning pronounced the heifer completely fat; ſo that the propoſition of the Jerſey Board of Agriculture, to which I alluded, and which may be ſeen in the Volume of communications of our Board of Agriculture, viz. that a beaſt from quite lean will become quite fat at the end of three months, if fed with parſneps and hay, is completely verified.

I am, SIR,

Your moſt obedient Servant.

H. J. DE SALIS.

Wing, Feb. 11, 1799.

Mr. MORE.

SIR,

AGREEABLY to my promiſe, I now inform you, that fifty fatting wethers, which had been diſappointed of their turneps by the ſeverity of the froſt, have been

been regularly ſerved with parſneps, to the amount, upon an average, of 420lb. a day, during ſeventeen days, including this. They immediately all but two took to them; and one of the two had a ſore mouth, which diſabled him from eating any but the ſofteſt meat. At firſt, however, the greateſt part of them ate this new food with diffidence, whilſt ſome of them, from the beginning, ſhewed a decided taſte for it. By degrees they all acquired the ſame taſte, and they now all of them ſhew the moſt marked impatience for their times of being ſerved. They feed greedily, but appear to be ſoon ſatiated. In the mean time, they are viſibly improving, and there is no doubt of their being ſoon ready for the market. Should any thing worth your attention occur during their progreſs, you ſhall hear farther from me.

The cow will be killed in the courſe of this, or in the beginning of next week. She has improved very much ſince the time of my laſt writing to you, and is now of

the degree of fatneſs expected in our markets a little before Eaſter. The only circumſtance relating to her that has occurred ſince I laſt wrote is, her having eaten more parſneps and leſs hay, ſince ſhe has been regularly ſerved with the roots freſh from the ground. I believe I mentioned to you before, that for ſome time ſhe did not eat the quantity of parſneps ſhe had done, but that ſhe ate more hay. The parſneps with which ſhe was then ſerved, had been dug up ſoon after Michaelmas.

I am, SIR,

Your obedient Servant,

H. J. DE SALIS.

Wing, March, 10, 1799.

Mr. MORE.

The

The Thanks of the Society were this Seſſion voted to THOMAS SKIP DYOT BUCKNALL, Eſq. for the following Communication relative to the Cauſe of BLIGHT on FRUIT-TREES, and which may not improperly be conſidered as a ſupplementary Paper to the Letters on Orcharding by that Gentleman, already inſerted in ſeveral Volumes of the Society's Tranſactions.

SIR,

I BEG you to preſent my compliments to the Society for the Encouragement of Arts, Manufactures, and Commerce; and acquaint them, that to gain information on the cauſe of decay in engrafted fruits, and make the ſyſtem of Orcharding which they have patronized and honoured by publiſhing in their Tranſactions, Volumes 11th, 12th, 13th, and 14th, as perfect as is in my power, I ſpent the month

month of September 1797, in Gloceſter-ſhire, had much converſation with perſons the beſt informed on the ſubject of fruits, and found it a general regret, that the *valuable old varieties* of cider-fruits are moſtly gone. The *Stire* is in the laſt ſtage of decay; yet, from the appearance of thoſe trees now totally worn out, they muſt have been, in their meridian health, *Noble-trees*. The *Redſtreak* is nearly gone, and there are many well-grounded fears entertained for the *Golden Pippin*. The *Fox-whelp* ſtill remains in full bearing, with many other of the valuable varieties in different ſtages of health.

This information, collected on the ſpot, it is requeſted the fruit-growers will attend to; for I am perſuaded, had my ſyſtem of orcharding been introduced fifty years ago, many of the loſt varieties might have been now in health: and by attending to that ſyſtem, thoſe ſtill remaining may be retained much longer than in a ſtate of unaſſiſted nature. In my firſt paper I ſtrongly recommended

commended to the planters to chooſe the ſorts which thrive in the neighbourhood, or are in health and full bearing in the country from whence they are to be brought; and from further experience I more clearly ſee the neceſſity of this injunction.

Shakeſpeare ſays, "There is a tide in the affairs of men;" may I apply the thought to fruits? There appears at preſent a criſis in the ſtate of Apples; all the varieties of the Ruſſets and Pearmains, with many others, are wonderfully going off. In a former paper I mentioned the Maidſtone diſtrict as abounding in valuable fruits; they have materially failed from blight during the laſt three years. Several of the neighbours in Eaſt Farleigh took me to examine the reſpective plantations, and pointed out one orchard of about three acres, which produced the moſt beautiful crop; a finer parcel of fruit could not have been ſhewn. We each concurred in the cauſe; it is explained in the Orchardiſt, and would be repetition here, *actual health ariſing from ſhelter, and cattle paſſing over the ground.*

During

During the many years I was engaged in forming the Orchardiſt, I would not ſuffer a word to be taken from a book, for copyiſts are apt to miſtake: all my obſervations are drawn from nature. But now I cannot expatiate on the ſyſtem of the old varieties, better than is done by Marſhall, an author of deſerved repute, who, in his Rural Economy of Gloceſterſhire, publiſhed in 1789, Volume II. page 239, remarks: "Engrafted fruits are not permanent, they continue but for a time."

T. A. Knight, Eſq. in his Treatiſe "On the culture of the Apple and Pear," has ſhewn a wonderful and truly ſcientific regard for the recovery of the valuable old varieties, &c. and is now rationally attempting to produce new varieties, equal or ſuperior to thoſe we regret the loſs of; and for the benefit of the world, I take the liberty of introducing an extract from a treatiſe he has publiſhed at Ludlow.

In page 6 he ſays: "The apple is not the natural product of any ſoil or climate, but owes its exiſtence to human art and induſtry

induſtry. The firſt varieties were no doubt introduced from the Continent: the continuance of every variety appears to be confined to a certain period, during the early part of which *only* it can be propagated with advantage to the planter."

Mr. Knight, with a view to ſecure ſome new valuable varieties, ſays in his excellent work, "I prepared ſtocks of the beſt kind of apple I knew, and planted ſix againſt a ſouth wall, in extremely rich mould."

Thus far Mr. Knight, through the whole of whoſe treatiſe there is much information. I allow that theſe ſix trees are the moſt beautiful both in ſtem and leaf I ever ſaw; and am ready to confirm the opinion, that they promiſe ſucceſs: the ſorts are, the *Golden-pippin*, *Foreſt-ſtire*, the *ſmall rich Mardin apple*, a very rich aſtringent yellow (but not acid) crab, and the yellow Siberia crab. Theſe trees are planted to grow free and fine, that the fruit may be in the higheſt perfection, to produce valuable ſeed for raiſing new varieties; and the bloſſoms were regularly

regularly croſſed according to the ſexual ſyſtem of plants, with the ſame attention as a nobleman would give to improve his breed of brood mares and colts, chooſing the beſt qualities in each, as far as nature will admit. As varieties are terms hardly thought of out of the cider countries, and little underſtood there, I beg indulgence farther to elucidate them as follows: Secure a new valuable kernel fruit, and from that engraft as beſt ſuits your ſentiment. Allow me to call the firſt tree primogeneous, or *ſtock:* all the grafts taken from this, or any of the deſcendants, will, for ſome generations, thrive; but when this *firſt ſtock* ſhall, by mere dint of old-age, fall into actual decay, a nihility of vegetation,—the deſcendants, however young, or in whatever ſituation they may be, will gradually decline; and from that time it would become imprudent in point of profit to attempt propagating that variety from any of them. This is the dogma which muſt be received: I do not expect a direct aſſent, neither do I wiſh

wiſh it, for it ſhould be taken with much reſerve. I only hope that I have fully explained the ſyſtem: it is a received opinion that a variety of apple may, according to its hardineſs, continue from one to two hundred years, the pear longer. My friend Mr. Knight allows care and attention may preſerve a tree perhaps half as long again, as when left to unaſſiſted nature. Grant me this, and I aſk no more: let thoſe who doubt make the actual experiment, and the very attempt will carry conviction.

To thoſe unacquainted with the term *variety* as applied to orcharding, I cannot define or explain it better than a valuable new apple raiſed from ſeed pip, or kernel, which has been fortunately preſerved by the diſtinction of the planter, and ſelected by him from ſome good appearance in the leaves, free growth of the wood, or beauty and ſtraitneſs of the ſtem. Such a tree out of the cider countries is termed kernel fruit, that is, an unengrafted tree; and the apple commonly takes its name from colour

colour or ſome inherent quality, as golden-pippin, ruſſet, cat's-head, &c.; or from the place where it was raiſed, as Farleigh pippin, New-Town pippin, Court of Wick pippin. This laſt is mentioned by Mr. Billingſley, in the Somerſet Report, page 124, as a new variety, and a favourite apple. In that neighbourhood, he ſays, "it originated from the pip of the golden pippin, and may be conſidered as a beautiful variety of that fruit. In colour and flavour it has not its ſuperior. The tree is large, handſome, ſpreading, and a luxuriant bearer, and on the whole cannot be too ſtrongly recommended." The apple I ſaw at the Board of Agriculture, but then it was decayed by being over-kept. His Excellency Rufus King ſent me a preſent of the New-Town pippin, and what he called the Greening. I wanted the New-Town pippin for the kernels; but when the fruit was cut, it was obvious, from the ſize of the pips, that the fruit had been gathered long before it was ripe, the better to con-

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vey it by ſea from America. It does not ſeem to ſuit our climate as yet, except in warm ſituations, though I have heard it highly praiſed by the Americans. Miller remarks, a little proper attention will naturalize many foreign plants. I am ſure it is wonderful how many different ſpecies of plants have been naturalized within my time. The moſt effectual way of doing it, is to keep the plants in health, and harden them by degrees.

Mr. Knight's ſyſtem and mine are in uniſon. He, as it were, attempts to create; I, to preſerve. Conſider, what do I recommend? To ſecure ſhelter—deſtroy the moſs—heal the wounds—check the baneful effects of canker—ſtop the oozing of gum; and by manuring the land, pruning and waſhing the tree, make it healthy, if it is not ſo old as to have loſt the energy of growth. Fruit-trees may bear for years after growth has become almoſt ſtagnant; then the knife can do but little, nay, would be miſchievous, if it lets in the cold winds. Medicine may keep a palſied man alive, but

but nothing in the healing art will make him young: therefore, what is attempted by way of ſcience, ſhould be begun in the early ſtages of the plantation, and ſo go on to the extreme of old-age.

Thoſe the leaſt converſant with vegetation know that the operations are nearly uniform. This induces me to mention, that in Hampton-Court Gardens there is a vine of the Black Hamburgh, which fills a houſe 72 feet long, and 18 feet over, making an area of 1300 feet ſuperficial of glaſs, under which there are more than 1800 bunches of grapes, all from one ſtem; and what is worthy obſervation, the branches fartheſt from the root produce the largeſt and cleareſt fruit. This vine is every year productive, merely from pruning, waſhing, and cleaning. The bunches are in the ſpring as regularly ſet out, and with as much attention, as the turnep-hoer ſets out his field crop. An incumbered tree never can attain its full ſize, or be in health; for when the free circulation of the ſap is checked,

checked, the tree becomes diſeaſed, and moſt of the inward branches are torpid or rotten: in this ſtate there remains no remedy but cutting them out. Now conſider what a misfortune in orcharding to have the powers of vegetation ſo loſt, which properly directed would have kept the tree in health. My intention in introducing the vine here, is to *aver*, that to whatever ſize nature can carry a fruit-tree by the aſſiſtance of pruning, waſhing, care, and ſhelter, ſuch tree is capable of growing much larger, and from that muſt of courſe acquire better health. May I ſay, growth and health are almoſt ſynonymous? for, where there is a freedom of growth, ſuch tree is little affected with canker or gum; neither would it be ſo much injured by inſects, who, by preying on the leaves and bloſſoms in the ſpring, are now known to be a material cauſe of blight. I wiſh to enforce that actual health would in ſome meaſure prevent blight.

There are many letters in my poſſeſſion corroborating the opinions above advanced reſpecting the preſervation of Fruit-trees, which will be publiſhed when theſe papers are collected.

Blight.

It ſhould be underſtood from the Orchardiſt, that each ſtep regularly tending towards bringing the tree into health, muſt be ſo far operative in preventing blight. Let us attempt to aſcertain from what blight ariſes: I ſhould ſuppoſe that whatever has a tendency to prevent the due impregnation of the bloſſoms, or injure the foliage of the tree, will in a certain degree cauſe blight. The farmers ſay my trees are blighted, and ſome of them imagine the inſects are brought over in thick hazy clouds: be aſſured the flies, grubs, moths, inſects, &c. do not come over in the winds from the Continent, but are bred at home from the eggs being depoſited about the tree in ſummer and autumn. And reſpecting

ing cold, it is not ſo much the intenſe cold which does the miſchief, as an alternate ſucceſſion from heat to cold: for when the ſun has rarified and expanded the air within the air-veſſels, then the ſucceſſion of froſty nights, heavy rains, cold winds, with ſnow or ſleet after a warm day, greatly tend to check the growth of the tree; and from the preceding warmth, theſe cauſes have more power to deſtroy the delicate formation and expanſion of an infantine vegetation, and prevent a due impregnation of the bloſſom without which there can be no fruit. Cold under-water, or land ſprings, ſtunt the tree, and cauſe blight. Long drought, with drying winds, injure the farina, ſo that it imperfectly performs the office nature has deſigned it for. Other cauſes may prediſpoſe the tree to blight, as an overabundant crop the preceding year, which ſo exhauſts the vital principle, that the tree has not ſufficient ſtrength to mature the fruit, and fill the bearing buds for the next ſpring: a want of free circulation of air cauſes blight.

Under any of the foregoing ſtatements, ſhould the trees be old, in a declining ſtate of health, or the branches covered with rotten bark, moſs, &c. under which inſects may have depoſited their eggs; the eggs may alſo be within the buds, or worked round in ringlets on the laſt year's ſhoots. I ſay, let the eggs be where they may, *ſwarms of depredators* will certainly iſſue to deſtroy the weakly foliage. On the the contrary, where the trees are clean, and in health, inſects are not ſo numerous, neither are they capable of being ſo deſtructive; for ſhould they devour part of the opening buds and leaves, a healthy tree will have ſufficient ſtrength remaining to produce a ſlight crop of fruit. Young ſtock poorly kept through the winter, in a ſtraw yard, ſhall be covered with vermin; when the ſtock are turned into good paſture, and acquire health, the vermin drop off; not that they are tired with their ſituation, but the health of the creature will not allow them to continue any longer there. Simi-

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lar circumſtances are known to attend the trees.

Obſerve, when rational means are made uſe of to give energy of growth to ſtandard fruit-trees; ſhould the tree acquire the growth, the rotten bark, moſs, &c. ſhall from that time gradually fall off, juſt as the vermin drop from the cattle. Theſe are known facts, and eaſily tried: to account for them, ſay, the cattle and trees are only getting into better health; this is the governing principle in both caſes. As one means of eſtabliſhing health in old trees, I recommended rubbing them over with oil: Mr. Fairman, has for ſome time uſed oil to good effect; and I ſhould now ſay, mix a little ſulphur or tobacco-duſt with the oil, to give it the conſiſtence of thin paint, which would have a tendency to offend the inſects, and drive them from the trees. It is obſervable, theſe little creatures are particularly delicate and careful in chooſing proper places to depoſit their eggs, and ſecure ſuch a nidus as may be fitting for the preſervation of their future progeny.

I, ſeven years ago, bought, by way of experiment, a handſome young tree, of the old varieties, the Nonſuch; and planted it in a proper ſituation, ſaying it ſhould not canker. The tree is now as clean and perfect as poſſible, merely from pruning and waſhing with ſoap-ſuds, and not permitting much fruit to grow, thinking it prudent firſt to form the tree before we expect the fruit.

I mentioned ſulphur or tobacco-duſt; but there are many cheap drugs, which could be eaſily applied to this purpoſe, particularly the bitter aloes. If thoſe concerned would only order one large old detached tree to be made perfectly clean, it may be ſoon proved whether the idea will anſwer; at the ſame time a good coat of manure ſhould be thrown over the ground as far as the roots extend.

No miſchief ariſes to fruit-trees until the warm weather commences, becauſe, before that period, inſects are not hatched; but the ſame degree of heat, which will cauſe the

the ſap to flow through the branches, and ſet the roots to work, is ſufficient to hatch many of the inſect tribe: others come out afterwards, and continue till near Midſummer, by which the foliage is moſtly eaten up. From this the planter runs a hazard for the next year, as there is hardly time from Midſummer for the tree ſo to recover as to fill the bearing buds, to produce a crop. I hope, with the aid of a little conſideration, I have nearly proved that the inſects for the moſt part produce the miſchief.

I remain, SIR, with many good wiſhes for the continued proſperity of the Society,

Your moſt obedient ſervant,

THOMAS SKIP DYOT BUCKNALL.

Hampton Court, Nov. 30, 1798.

Mr. MORE.

PAPERS IN POLITE ARTS.

POLITE ARTS.

In the Sixteenth Volume of theſe Tranſactions, page 279, is inſerted a DISSERTATION by Mr. TIMOTHY SHELDRAKE, on PAINTING IN OIL, in a manner ſimilar to that practiſed in the ancient Venetian School. What now follows is a continuation of Mr. Sheldrake's Paper, and gives an account of the Proceſs uſed to ſeparate the Mucilage from Linſeed Oil, &c. ſo as to fit them to ſerve as vehicles in that manner of Painting.

Account of the Proceſs uſed to ſeparate the Mucilage from Linſeed Oil, &c.

I HAD read in ſome book, the title of which I do not recollect, that Linſeed Oil might be *purified* by ſhaking it with water which would imbibe the impurities, and leave the oil more limpid. I tried this experiment by ſhaking linſeed oil with warm water,

water, and was ſurpriſed to find they did not ſeparate, but remained united in the form of emulſion. I then boiled them together, and found their tendency to ſeparate diminiſh: as it is the known property of gums or mucilage to keep oil and water united in this ſtate, I was induced to ſuſpect the preſence of mucilage in linſeed oil.

I had read in Doſſie a method of preparing what he calls *fat oil.* It is effected by placing linſeed oil in a ſhallow veſſel expoſed to the heat of the ſun, and ſtirring it frequently: in a certain time it loſes its property of drying, thickens, and acquires a degree of tenacity that makes it proper for a ſize or cement for gilders, &c. A ſimilar ſubſtance is alluded to by Leonardo da Vinci.

Taking the exiſtence of mucilage in this oil for granted, I conjectured that the alteration produced in its texture by Doſſie's proceſs, aroſe from the evaporation of ſome of its principles, and the more intimate union

union of the reſt in conſeqence of that evaporation: to verify this conjecture, I tried the following experiment.

I filled a half-pint phial full of linſeed oil, corked and tied it ſecurely over with a bladder. This I expoſed to the heat of the ſun in ſummer, during the whole day: after it had remained a few days in this ſituation, the upper part of the phial was covered with drops, ſimilar to thoſe produced by holding a wet bottle to dry before the fire. I then ſhook it well, which made the contents look muddy, and ſet it to reſt again. After a time it became clear, and a portion of tranſparent liquor like water lay at the bottom. I then repeated the ſhaking and ſetting it to reſt, till no additional quantity of this fluid was ſeparated.

By trying this experiment repeatedly upon oils procured from different places, I found that ſome oils afforded much more mucilage than others. From ſome I ſeparated a third part of mucilage; from others, a pint would not afford more than

a table

a table ſpoonful, and ſometimes leſs. Whether this difference in the reſult was radically in the oils, or from a difference in the proceſſes conducted by means ſo variable as the heat of the ſun, I am not able to aſcertain.

Upon trying the ſame experiment with nut and poppy oil, I found the ſame reſult, but in a different degree. The average quantity afforded by nut oil was, I believe, not more than a third part of the average of linſeed oil; and the average of the poppy oil was not ſo much as a ſixth. In ſome caſes, particularly of the poppy oil, I did not obtain any.

The colour of the oil always diminiſhed as the mucilage was abſtracted; but the mucilage was always as colourleſs as water. It is a queſtion I will not pretend to decide, whether the colour of theſe oils depends upon the preſence of the mucilage, or upon any other principle which is deſtroyed by the action of light. I have in ſome inſtances had the oil as colourleſs as water.

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This decompoſition of the oils, if it may be ſo called, is curious, as proving the exiſtence of mucilage in them; but as it is very troubleſome, may it not be adviſable to prefer thoſe which have naturally the leaſt mucilage in their compoſition?

After pouring the oils from the mucilage, I put ſeveral quantities of the latter together, and found them mix without any difficulty. I mixed this mucilage with water, and found it unite with it in any proportion without becoming turbid. I laid it upon plates of metal, expoſing them to dry in the ſun, and before the fire, and when dry waſhed them with a ſpunge and water; but it ſhewed no tendency to diſſolve; though, while in a liquid ſtate, it ſeemed to poſſeſs all the properties of a gum.

As the proceſſes by which I diſſolved the amber and copal to make the oil varniſhes, are to be found in many books, and as it will be better for artiſts to purchaſe than attempt to make thoſe varniſhes, it can ſcarcely be thought neceſſary to detail thoſe proceſſes

proceſſes here: but as I believe the methods by which I diſſolved the copal in ſpirit of turpentine and ſpirit of wine, are not known, I ſhall now ſubjoin them.

To diſſolve Copal in Spirit of Turpentine.

N. B. Whatever quantity is to be diſſolved, ſhould be put into a glaſs veſſel capable of containing at leaſt four times as much, and it ſhould be high in proportion to its breadth.

Reduce two ounces of copal to ſmall pieces, and put them into a proper veſſel. Mix a pint of ſpirit of turpentine with $\frac{1}{4}$ of ſpirit of ſal armoniac; ſhake them well together; put them to the copal; cork the glaſs, and tie it over with a ſtring or wire, making a ſmall hole through the cork. Set the glaſs in a ſand heat ſo regulated as to make the contents boil as quickly as poſſible, but ſo gently that the bubbles may be counted as they riſe from the bottom. The ſame heat muſt be kept up exactly till the ſolution is complete.

It

It requires the moſt accurate attention to ſucceed in this operation. After the ſpirits are mixed, they ſhould be put to the copal, and the neceſſary degree of heat be given as ſoon as poſſible. It ſhould likewiſe be kept up with the utmoſt regularity. If the heat abates, or if the ſpirits boil quicker than is directed, the ſolution will immediately ſtop, and it will afterwards be in vain to proceed with the ſame materials; but if properly managed, the ſpirit of ſal ammoniac, will be ſeen gradually to deſcend from the mixture, and attack the copal which ſwells and diſſolves, except a very ſmall quantity which remains undiſſolved.

It is of much conſequence that the veſſel ſhould not be opened till ſome time after it has been perfectly cold. It has twice happened to me, on uncorking the veſſel when it was not warm enough to affect the hand, that the whole of the contents were blown with violence againſt the cieling. It is likewiſe important that the ſpirit of turpentine ſhould be of the beſt quality. I have

never ſucceeded with that which is ſold at the colour-ſhops; but whenever I procured my ſpirits at Apothecaries Hall, I have diſſolved the copal by the proceſs I have deſcribed, without difficulty.

This varniſh is of a rich deep colour when viewed in the bottle, but ſeems to give no colour to the pictures it is laid on: if left in the damp, it remains ſacky, as it is called, a long time; but if kept in a warm room, or placed in the ſun, it dries as well as any other turpentine varniſh; and when dry, it appears to be as durable as any other ſolution of copal.

To diſſolve Copal in Alcohol.

Diſſolve half an ounce of camphire in a pint of alcohol; put it in a circulating glaſs, and add four ounces of copal in ſmall pieces; ſet it in a ſand heat, ſo regulated that the bubbles may be counted as they riſe from the bottom; and continue the ſame heat till the ſolution is completed.

Camphire

Camphire acts more powerfully upon copal than any ſubſtance that I have tried. If copal is finely powdered, and a ſmall quantity of dry camphire rubbed with it in the mortar, the whole becomes in a few minutes a tough coherent maſs. The proceſs above deſcribed will diſſolve more copal than the menſtruum will retain when when cold. The moſt economical method will therefore be to ſet the veſſel which contains the ſolution by, for a few days; and when it is perfectly ſettled, pour off the clear varniſh, and leave the reſiduum for a future operation.

This is the brighteſt ſolution of copal that I have ſeen: it is an excellent varniſh for pictures, and may, perhaps, be found to be an improvement in fine Japan works; as the ſtoves uſed in drying thoſe articles may drive off the camphire entirely, and leave the copal pure and colourleſs on the work.

N. B. Copal will diſſolve in ſpirit of turpentine by the addition of camphire, with

the ſame facility, but not in the ſame quantity, as in alcohol.

At the time I determined to lay the preceding papers before the Society, I conceived that the quick and certain manner in which the vehicle dried, was one of its advantages: but as that circumſtance has been objected to, and in ſome caſes really is a diſadvantage, I have ſince endeavoured to remove that objection by the following proceſs.

Put a pint of nut or poppy oil into a a large earthen veſſel; make it boil gently upon a ſlow fire; put in by degrees two ounces of ceruſe, and ſtir it continually till the whole is diſſolved.

Have ready a pint of the copal oil varniſh heated in a ſeparate veſſel; pour this by degrees into the hot oil, and ſtir them together till all the ſpirit of turpentine is diſſipated; let it then be ſet by till cold, when it will be for uſe.

It is obvious that as this is a compound of the copal varniſh with the leaſt exceptionable

tionable of the drying oils, it will partake of the properties of each of its component parts. It gives leſs brightneſs and durability to colours than the varniſh will, but more than oil: but as it certainly may be uſed in painting in the ſame manner as any other drying oil, and gives more brightneſs and durability to colours than they can derive from any other oil, it is not unreaſonable to ſuppoſe that it will prove an advantageous vehicle.

I have mentioned ſpecific quantities of the ingredients; but it is eaſy to ſee that the relative proportions may be varied according as it is required to dry faſter or ſlower. It muſt be remarked too, that whenever the mixture is to be made, both the ingredients ſhould be hot, becauſe, if either of them is cold, the mixture becomes turbid, and a part, often the whole of the copal, is precipitated: but this inconvenience is avoided, by mixing and boiling them together, as I have directed. It muſt likewiſe be obſerved, that after ſome time a ſpontaneous alteration takes

place, which diminiſhes, and at laſt deſtroys the drying quality of this mixture: it will therefore be adviſable to uſe it freſh, or at leaſt not to uſe it after it has been made more than a month or ſix weeks.

The

The Society this Seſſion having received from Mr. NICHOLSON, of Ripon in Yorkſhire, a DRAWING, intended as a Specimen of the Proceſs for producing the Lights in ſtained Drawings, by removing, after the Shadows are waſhed in, the Colour where the Lights are required, giving by this means the effect of Body Colour with greater clearneſs, and without any of its diſadvantages; and it appearing that Mr. NICHOLSON's Method of tinting Drawings promiſes to be of uſe in the practice of Drawing in Water-colours, and produces a more ſpirited effect; the Society agreed to Mr. NICHOLSON's Propoſal, and purchaſed from him, at the price of Twenty Guineas, the complete Proceſs for performing the Work, as communicated in the following Paper.

Proceſs for producing the Lights in ſtained Drawings, by Mr. Francis Nicholſon, of Ripon, Yorkſhire.

THE difficulty of preſerving the lights in ſtained drawings with freedom and preciſion, is ſo univerſally felt by thoſe who

cultivate that branch of the arts, the practice of which is every day growing more extenſive, that the ſtatement of this circumſtance alone is ſufficient for the introduction of the following proceſs, by which that difficulty is removed, and by which all the effect of body colour may be obtained, without any of its inconveniences or defects. It is applicable to every ſubject, to the richneſs of foliage, of rocks, or of foreground; and in ruins, their moſt pictureſque appendages of hanging ſhrubs, weeds, &c. may be expreſſed by it with the utmoſt ſharpneſs, and with all the lightneſs and freedom of which body colour, or oil painting, are capable.

The principle of this proceſs conſiſts in covering the places where the touches of light are intended to be, with a compoſition not liable to be diſplaced by waſhing over it with the colour, and ſuch as may be afterwards removed by a fluid in which the colours uſed in water are not ſoluble.

This

This compoſition or ſtopping mixture is made by diſſolving bees-wax in oil of turpentine, in the proportion of one ounce of wax to five ounces of the oil; and, as near the time of uſing it as may be convenient, grind with the pallet-knife as much flake white, or white-lead, in oil of turpentine, as may be wanted at one time; dilute it with the above ſolution until it will work freely with the pencil, and appear on the paper, when held between the eye and the light, to be opake. It is neceſſary to obſerve this, or the firſt touches will not be ſufficiently viſible, after being waſhed over with the colours, to aſcertain the places of the ſecond. It is alſo neceſſary to uſe a frame inſtead of the drawing-board, or to paſte the paper on the frame of the drawing-board, ſo as to remove the pannel; becauſe the firſt and ſecond touches muſt be put on with the drawing placed between the eye and the light, as they will be moſt viſible in that ſituation. On this frame paſte the paper wet ſo as to dry firm: when quite dry, draw the outline, and proceed as follows:

1ſt, With

1ſt, With a fine ſmall hair pencil, and the ſtopping mixture, cover thoſe places where the clear whiteneſs of the paper may be wanted, except in the ſky: let it dry a few minutes; then wet the paper on both ſides, and while it is wet waſh the ſky. The ſhadows of the clouds, diſtances, and general breadths of ſhadow, muſt be put in with the grey tint; and over the places of the light waſh the tints of the brighteſt light; thoſe will be generally yellow oker, or light red.

The light of the clouds may be preſerved ſharp by preſſing on that part a piece of tiſſue-paper, previous to the waſhing of the ſky; this, by abſorbing the ſuperfluous moiſture, will prevent the colour from ſpreading farther than is deſired. Suffer the whole to be very dry; and

2dly, Touch in with the ſtopping mixture the ſharp and prominent parts of the brighteſt lights; let them dry a few minutes, then waſh over them with the tints of the next degree of light.

3dly,

3dly, Stop with the mixture the ſecond order of touches, and waſh over them with the middle tints; ſtrengthen alſo at the ſame time the breadths of ſhadow.

4thly, Stop with broad touches of the mixture the places of the middle tint, uniting them to the former touches, and extending them ſo as to graduate the middle colours into the ſhadow: ſtrengthen the ſhadows, making them nearly as dark as they are intended to be, and let the whole be perfectly dry.

Then take oil of turpentine, and with a ſponge, or hog's-hair pencil, waſh over the places where the mixture has been uſed, rubbing it with the bruſh until it be diſſolved: clear it away with a linen rag, and waſh it with more oil of turpentine ſo long as any white lead appears; then let it dry.

Warm the drawing; then with a ſoft bruſh, and highly rectified ſpirit of wine, waſh the places where the oil of turpentine has been uſed, to clear away the remainder of it: rub the drawing lightly on the face, but ſponge it well on the back.

When

When dry, tint down the lights where it may be wanted; harmonize the colouring, and cut the ſhadows to effect, with ſtill darker tints as may be neceſſary.

If other touches of light ſhould afterwards be wanted in the ſhadowed parts, the colour may be eaſily removed by a pencil formed of ſponge, with water ſufficiently to produce them with as much ſtrength as can be deſired; then ſtop them with the mixture; waſh the ſhadow over the touches, bringing it to the colour taken off; and when dry, remove the mixture with the oil of turpentine and ſpirit of wine.

The

The Society having this Seſſion received two BUSTS modelled in CLAY, and two CASTS in PLASTER OF PARIS, all executed by Miſs KNIGHTS, of Sticken, in Buckinghamſhire, hardened by Wax in ſuch manner that thoſe in Clay repreſent Bronze, and thoſe in Plaſter, Marble, preſented their GREATER SILVER PALLET to theſe ingenious young Ladies, from whom the following Method of thus hardening the Clay and Plaſter was received; and the Buſts are reſerved in the Society's Collection.

SIR,

WE have taken the liberty of getting a friend to convey to you two Buſts, one of a bronze, and the other of a marble colour. The former is compoſed of clay, and the other of Plaſter of Paris: they are each wrought up to their colours by wax only.

only, and conſidered good likeneſſes of ourſelves.

Our only motive in getting them preſented, is to have the opinion of the Society as to what we think an improvement in producing likeneſſes, with a diminution of labour and expence.

We remain very reſpectfully,

SIR,

Your obliged humble ſervants,

L. and M. KNIGHT.

SAMUEL MORE, Eſq.

The method of giving clay models the appearance of bronze, and hardening caſts in plaſter, is ſimply by waxing them:—which is done by making the clay model moderately hot by the fire, and then pouring melted bees-wax on it, and continuing to

to do ſo till ſuch time as the colour becomes ſufficiently dark.

Caſts in plaſter muſt not be made nearly ſo hot as the clay models; the wax muſt be of the pureſt ſort; and the caſt muſt be dipped into the veſſel of melted wax.

PAPERS
IN
MECHANICKS.

MECHANICKS.

In the Year 1796 the Society voted their GOLD MEDAL to Mr. ROBERT HYNAM, of St. Peterſburg, for his INSTRUMENT FOR GAUGING CUTTERS FOR WHEELS for the uſe of Clock and Watch-makers, on condition that he ſent a complete Inſtrument, and the Calculations he had made for it, to the Society for the uſe of the Public; and this Seſſion the Inſtrument and the Volume of Calculations having been received, the GOLD MEDAL was ſent to Mr. HYNAM. His Letters on the ſubject, with Plates of the Inſtrument, are here inſerted; and the Inſtrument itſelf, with a Volume of his Calculations, are reſerved in the Society's Collection.

MY LORD,

I TAKE the liberty of addreſſing myſelf to your Grace, in a matter (I preſume) of real utility to Clock and Watch-makers,

and indeed in all mechanical performances where wheels are uſed with teeth. It need not be diſſembled, that they do many things by rote and gueſs, which might be performed with more certainty and more expedition, by calling in the principles of arithmetic and geometry, not to ſay of mechanicks. Of this nature ſeems to be the uſing of cutters in gauging a given number of teeth in a wheel of a given diameter. Now the diameter of a circle being to its circumference nearly as 1 to 3 (which ratio may be accurate enough for the purpoſes here meant), a wheel of ſix inches diameter will have about eighteen inches in its circumference. Since then, in cutting a number of teeth in a wheel, you are to have as many interſtices or ſpaces between the teeth as the teeth themſelves, you will therefore have twice as many diviſions in the circumference as the number of teeth; viz. one half of the diviſions for the teeth themſelves, and the other half for the ſpaces between. You need then only to divide the

the circumference into twice the number of teeth, and you will have the breadth of each tooth, as well as the breadth of each ſpace between them, and this ſame breadth is the thickneſs of the cutter with which the teeth are to be cut. Suppoſe for example, in the wheel above-mentioned, of ſix inches diameter, you are to have 240 teeth, what will be the thickneſs of the cutter for cutting thoſe teeth? Twice 240 is 480; and $\frac{1}{4\,8\,0}$ inch gives $\frac{1}{8\,0}$ of an inch for the breadth of each tooth as well as of each ſpace, and for the thickneſs of your cutter. This, notwithſtanding, I have found by repeated operations, that $\frac{1}{9\,0}$ or $\frac{1}{1\,0}$ will anſwer better than $\frac{1}{1\,0}$. For that, beſides its coming out in rounder numbers, ſeems to be founded in the very nature of things, ſince the teeth grow narrower towards the centre, than they are towards the circumference; and ſuch an allowance is always indiſpenſably to be made in wheels of ſmall diameters, wherein the length of the teeth is very conſiderable in reſpect of the length

of the diameters. Taking therefore this $\frac{1}{240}$ along with us, and ſuppoſing farther every inch to be divided into forty parts, if the diameter of a wheel be 6 inches, or 240 of ſuch diviſions, and the number of its teeth 240, we ſhall have for the breadth of a tooth or ſpace, and for the thickneſs of a cutter to cut it with, $\frac{1}{2}$ or $1\frac{1}{2}$ of thoſe fortieth parts of an inch, or $\frac{1}{240}$ of an inch as before. After the ſame manner the thickneſs of a cutter for a wheel of any diameter, and any number of teeth, may be calculated: for inſtance, if the diameter of a wheel be 38 of thoſe fortieth parts, and the number of teeth 66, the thickneſs of the cutter will be $\frac{1}{2}$, $\frac{38}{660}$, or $\frac{38}{660} \times \frac{1}{2}$ of thoſe fortieth parts of an inch; or again, $\frac{38}{660} \times \frac{1}{240}$ of an inch. But alſo the thickneſs of a cutter may be immediately deduced from the firſt cutter, viz. from that which ſerved for a wheel of ſix inches diameter, with 240 teeth in it; for the breadths of the teeth, as well as the thickneſſes of the cutters, are *directly* as the circumferences or diameters

diameters of the wheels, and *inverſely* as the numbers of the teeth. You need only therefore multiply $\frac{1}{50}$ of an inch by the diameter of a wheel, and divide the product by the number of teeth. Thus, in the wheel immediately preceding, the thickneſs of the cutter is $\frac{1}{50} \times \frac{58}{60}$.

In order to exhibit the thickneſs of a cutter accurately, for all ſorts of wheels uſed in watch and clock-making, I have calculated tables, and invented a gauging inſtrument. The inſtrument is a ſector of a circle, on the arch ofwhich there are laid down ſix inches, each divided into forty equal parts;* and it has two indexes, one from the centre of motion to the circumference, the other from the ſame centre to a moveable piece of ſteel which reaches to the gauge.

Theſe indexes are to one another as $11\frac{1}{4}$ inches to $\frac{1}{4}$ an inch, or as 45 to 2, and

* Since then the ſix inches are expanded here on an arch, inſtead of being laid down in a ſtrait line, they occupy leſs ſpace, which furniſhes us with an additional reaſon why $\frac{1}{50}$ or $\frac{3}{50}$ of an inch ſhould be taken rather than $\frac{3}{80}$.

therefore, as $\frac{3}{4}$ to $\frac{1}{30}$. So that, whilſt the ſhorter index moves $\frac{1}{30}$ of an inch, the longer will in the ſame time move $\frac{3}{4}$ or $\frac{30}{40}$ of an inch, *i. e.* 30 of thoſe diviſions, 40 of which every inch on the arch is divided into. And, converſely, whilſt the longer index moves $\frac{30}{40}$ of an inch, the ſhorter will move $\frac{1}{30}$ of the ſame; and will therefore exhibit in the gauge $\frac{1}{30}$ of an inch for the thickneſs of a cutter to cut 240 teeth, in a wheel of ſix inches diameter. And the ſame holds good for a cutter of any other thickneſs.

Now the tables calculated by me are accommodated to the longer index of this gauging inſtrument; ſince, whatever thickneſs of a cutter is ſhewn from the tables by the longer index, the true thickneſs of it is $\frac{2}{45}$ of the former, and is ſhewn on the gauge by the ſhorter index. For this reaſon, in the wheel before-mentioned (of 6 inches or 240 diviſions in the diameter, with 240 teeth in it), I aſſume the thickneſs of the cutter, not $\frac{1}{30}$ of an inch, but

30 of thoſe fortieth diviſions; and from that wheel, as a ſtandard, I deduce all other wheels, *e. g.* a wheel of 38 diviſions in diameter with 66 teeth in it; wherein the number of diviſions in the diameter of the wheel, viz. 38, I multiply by the *conſtant number* 30, and divide the product by the number of teeth in the wheel, viz. by 66; and the quotient $30\times\frac{38}{66}=17.273$ is the thickneſs of the cutter required, as ſhewn on the arch of the ſector by the long index. And this is the rule by which the tables have been calculated, and which is manifeſt from what has been ſaid above.

I ſhall only add a few words concerning the uſe of the tables and the inſtrument. A wheel of any diameter, with any number of teeth being given, I look in the tables for the thickneſs of the cutter proper for that wheel. Having found it, I bring the longer index of the inſtrument to that number; and at the ſame time the gauge (by means of the ſhorter index) exhibits to me the true thickneſs of that cutter between the two pieces of ſteel.

Thus

Thus much, my Lord, I lay before your Grace, as Preſident of a Society which has ſo well deſerved of the Arts and of Great Britain. If I meet your and their approbation, which is all the encouragement I aim at, I may lay before your Grace many other inſtruments and machines, with their deſcription and uſes, which, at the ſame time that they greatly ſhorten and ſimplify the buſineſs of watch and clock-making, render the execution of their ſeveral parts more accurate.

I have the honour to ſubſcribe myſelf,

My Lord,

Your Grace's

Moſt obedient

and moſt humble ſervant,

Robert Hynam.

St. Peterſburg,
Sept. 2d, 1795.

His Grace the Duke of Norfolk.

The

The number of calculations in this work (beginning with $\frac{1}{8}$ of an inch diameter, increaſing $\frac{1}{40}$ of an inch, and ending with ſix inches diameter) conſiſt of twenty-three thouſand five hundred and upwards. In the courſe of the work ſeveral numbers have no decimals affixed to them. This is when the diviſor is not quite contained in the dividend, and the quotient is only approximate. Thus, ſuppoſe a quotient ſhould be 31.99765, as I put but two places of decimals in the tables, I write 32.00, or if any quotient ſhould be 33.5294, making an allowance for the figure 9. In the third place, I write 33.53, and my error in this caſe is but 0.0005, *i. e.* but $\frac{1}{2}$ of a thouſandth part of unity.

Annexed

Annexed is a Table of Proportions.

I have begun with the leaſt Diameter, introduced two intermediate ones, and the greateſt Diameter.

TABLE OF PROPORTIONS.

No. of Teeth.	Thickneſs of Cutter.	No. of Teeth	Thickneſs of Cutter.	No. of Teeth	Thickneſs of Cutter.	No. of Teeth	Thickneſs of Cutter.
5 *Diviſions*		40 *Diviſions*				67	17.91
10	15	30	40	48	25	68	17.65
11	13.64	31	38.71	49	24.49	69	17.39
12	12. 5	32	37. 5	50	24.	70	17.14
13	11.54	33	36.36	51	23.53	71	16.90
14	10.71	34	35.29	52	23.08	72	16.67
15	10.	35	34.29	53	22.64	73	16.44
16	9.38	36	33.33	54	22.22	74	16.22
17	8.32	37	32.43	55	21.82	75	16.
18	8.33	38	31.58	56	21.43	76	15.79
19	7.89	39	30.77	57	21.05	77	15.58
20	7. 5	40	30.	58	20.69	78	15.38
21	7.14	41	29.27	59	20.34	79	15.19
22	6.82	42	28.57	60	20.	80	15.
23	6.52	43	27.91	61	19.67	81	14.81
24	6.25	44	27.27	62	19.35	82	14.63
25	6.	45	26.67	63	19.05	83	14.46
26	5.77	46	26.09	64	18.75	84	14.29
		47	25.53	65	18.46	85	14.12
				66	18.18	86	13.95

No. of Teeth	Thickneſs of Cutter.	No. of Teeth	Thickneſs of Cutter.	No. of Teeth	Thickneſs of Cutter.	No. of Teeth	Thickneſs of Cutter.
87	13.79	72	46.67	110	30.55	79	91.14
88	13.64	73	46.03	111	30.27	80	90.
89	13.48	74	45.41	112	30.	81	88.89
90	13.33	75	44. 8	113	29.73	82	87.81
91	13.19	76	44.21	114	29.47	83	86.75
92	13.04	77	43.64	115	29.22	84	85.71
93	12.90	78	43.08	116	28.97	85	84.71
94	12.77	79	42.53	117	28.72	86	83.72
95	12.63	80	42.	118	28.47	87	82.76
96	12. 5	81	41.48	119	28.24	88	81.82
97	12.37	82	40.98	120	28.	89	80.90
98	12.24	83	40.48	121	27.77	90	80.
99	12.12	84	40	122	27.54	91	79.12
100	12.	85	39.53	123	27.32	92	78.26
		86	39.07	124	27.10	93	77.42
112	*Diviſions*	87	38.62	125	26.88	94	76.60
50	67. 2	88	38.18	126	26.67	95	75.79
51	65.88	89	37.73	127	26.46	96	75.
52	64.62	90	37.33	128	26.25	97	74.23
53	63.40	91	36.92	129	26.05	98	73.47
54	62.22	92	36.52	130	25.85	99	72.73
55	61.09	93	36.13	131	25.65	100	72
56	60.	94	35.74	132	25.45	101	71.29
57	58.95	95	35.37	133	25.26	102	70.59
58	57.93	96	35.	134	25.07	103	69.90
59	56.95	97	34.64	135	24.89	104	69.23
60	56.	98	34.29	136	24.71	105	68.57
61	55.08	99	33.94	137	24.53	106	67.92
62	54.19	100	33. 6	138	24.35	107	67.29
63	53.33	101	33.27	139	24.17	108	66.67
64	52. 5	102	32.94	140	24.	109	66.06
65	51.69	103	33.62			110	65.45
66	50.91	104	32.31	240	*Diviſions*	111	64.86
67	50.15	105	32.	74	97.30	112	64.29
68	49.41	106	31.70	75	96.	113	63.72
69	48.70	107	31.40	76	94.74	114	63.16
70	48.	108	31.11	77	93.51	115	62.61
71	47.32	109	30.83	78	92.31	116	62.07

No. of Teeth	Thickneſs of Cutter.	No. of Teeth	Thickneſs of Cutter.	No. of Teeth	Thickneſs of Cutter.	No. of Teeth	Thickneſs of Cutter.
117	61.54	156	46.15	195	36.92	234	30.77
118	61.02	157	45.86	196	36.73	235	30.64
119	60.50	158	45.57	197	36.55	236	30.51
120	60.	159	45.28	198	36.36	237	30.38
121	59.50	160	45.	199	36.18	238	30.25
122	59.02	161	44.72	200	36.	239	30.13
123	58.54	162	44.44	201	35.82	240	30.
124	58.06	163	44.17	202	35.64		
125	57. 6	164	43.90	203	35.47		
126	57.14	165	43.64	204	35.29		
127	56.69	166	43.37	205	35.12		
128	56.25	167	43.11	206	34.95		
129	55.81	168	42.86	207	34.78		
130	55.38	169	42.60	208	34.62		
131	54.96	170	42.35	209	34.45		
132	54.55	171	42.11	210	34.29		
133	54.14	172	41.86	211	34.12		
134	53.73	173	41.62	212	33.96		
135	53.33	174	41.38	213	33.80		
136	52.94	175	41.14	214	33.64		
137	52.55	176	40.91	215	33.49		
138	52.17	177	40.68	216	33.33		
139	51.80	178	40.45	217	33.18		
140	51.43	179	40.22	218	33.03		
141	51.06	180	40.	219	32.88		
142	50.70	181	39.78	220	32.73		
143	50.35	182	39.56	221	32.58		
144	50.	183	39.34	222	32.43		
145	49.66	184	39.13	223	32.29		
146	49.32	185	38.92	224	32.14		
147	48.98	186	38.71	225	32.		
148	48.65	187	38.50	226	31.86		
149	48.32	188	38.30	227	31.72		
150	48.	189	38.10	228	31.58		
151	47.68	190	37.89	229	31.44		
152	47.37	191	37.70	230	31.30		
153	47.06	192	37. 5	231	31.17		
154	46.75	193	57.31	232	31.03		
155	46.45	194	37.11	233	30.90		

SIR,

SIR,

STIMULATED by the mark of honour conferred upon me by the Society, I reviewed the work I had preſented to them, and happily fell on a method of calculating the tables with more eaſe, much ſhorter, and leſs liable to error. This encourages me (if it meets the Society's approbation) to make the gauging inſtrument more univerſal, without altering its conſtruction in the ſmalleſt degree. I mean only to extend the arch upon the inſtrument ſix inches more than it is at preſent, and to divide one of its edges into 12 inches, and each into 40 equal parts*. By this ſmall addition, the

* A ſcale, laid down on an arch of a circle whoſe radius is only 11¼ inches, ſhould not be uſed in gauging wheels of large diameters. Such wheels ſhould have their diameters gauged by a ſtrait line divided into inches, and each inch into forty equal parts: for in large wheels the length of the teeth bear a ſmall proportion to the diameters; but in wheels of ſmall diameters the length of the teeth is very conſiderable in reſpect to the length of the diameters, as I have before obſerved.

the thickneſs of cutters for cutting wheels may be accurately determined from $\frac{1}{4}$ of an inch to two feet diameter, in which may be cut from 8 teeth to 2000 and upwards; a number, I believe, never uſed in practice. The inſtrument not admitting a ſcale to be laid down more than 12 inches in length, therefore, when a diameter exceeds that length, the radius taken and doubled gives the diameter.

As the following rule is very ſimple and eaſily underſtood, I think it renders the continuation of the tables unneceſſary. A few examples may ſuffice, more eſpecially as the number of wheels uſed of a larger diameter than ſix inches bears a ſmall proportion to thoſe wheels uſed of a leſs diameter.

Rule.

Divide the conſtant number 30 by the number of teeth in the wheel, and multiply the quotient by the number of diviſions contained in its diameter, and the product will

will be the thickneſs of the cutter. And by adding the thickneſs of the cutter found to the quotient, you have the thickneſs of another cutter for a wheel which contains one diviſion more in diameter; for, as long as the number of teeth in the wheel continues the ſame, whatever are the number of diviſions in the diameter of the wheel, there is only one calculation to be made; all the other thickneſſes are found by *addition only*.

Explanation.

Suppoſe the number of teeth in the wheel is 240, and the diviſions in the diameter 241. Divide 30, the conſtant number, by 240, and the quotient will be 125. Multiply this quotient 125 by 241, the diviſions in the diameter of the wheel, and the product will be 30.125, the thickneſs of the cutter in this caſe. Now, if the diviſions in the diameter of the wheel are 242, and the number of teeth in the wheel 240,

add 125 the quotient, and 30.125 the thickneſs of the cutter juſt found, and the ſum of 30.250 will be the thickneſs of a cutter for a wheel having 242 diviſions in diameter, and 240 teeth. Again, if the diviſions in the diameter of the wheel are 243, and the number of teeth in the wheel 240, add 125 and 30.250, and the ſum 30.375 will be the thickneſs of a cutter for 243 diviſions in diameter, as may be farther ſeen by the following ſtatement, and may be compared by the tables ſent.

Diviſion in D.am. ,83333 Quotient

Teeth $\frac{1}{60}$=,83333,83333 ×60=49,99980 *Thickneſs of cutter.*

61=50,83313
62=51,66646
63=52,49979
64=53,33312
65=54,16645
66=54,99978
67=55,83311
68=56,66644

Place

Place the quotient over the thickneſs of the cutter 49.99980; add them together for another thickneſs of cutter for a wheel having one more diviſion in diameter, viz. 61; and ſo proceed with 62, 63, 64, &c. &c. The teeth in the wheel to remain the ſame number 36. But to avoid intermediate numbers, the teeth in the wheel remaining the ſame, and the diameter of the wheel increaſing to any number of diviſions, you have only to multiply the quotient found by the number of diviſions in the new diameter, and you will have the thickneſs of the cutter. If the diameter of the wheel ſhould be leſs, proceed as above.

Examples wherein the Teeth and Diameters differ.

Teeth	W.D.	Thickneſs Cutter.	W.D.	Thickneſs Cutter.
	$\frac{30}{250}\times 295=35,40$		$\frac{30}{455}\times 566=39,95$	
	$\frac{30}{275}\times 292=31,85$		$\frac{30}{600}\times 720=36$	
	$\frac{30}{300}\times 250=25$		$\frac{30}{1000}\times 480=14,40$	
	$\frac{30}{320}\times 298=35,52$		$\frac{30}{1000}\times 960=28,80$	
	$\frac{30}{330}\times 560=44,25$		$\frac{30}{2000}\times 960=14,40$	

The foregoing numbers $\frac{1}{16}$ ſhould have but two places of decimals agreeably to the tables: then they would be,

Thickneſs of Cutter.

50,
50,83
51,67
52,5
53,33
54,17
55,
55,83
56,67

I am, SIR,

Your moſt obedient humble ſervant,

ROBERT HYNAM.

St. Peterſburgh, Jan. 20, 1797.

Mr. MORE.

Deſcription

The foregoing numbers $\frac{1}{10}$ ſhould have but two places of decimals agreeably to the tables: then they would be,

Thickneſs of Cutter.

50,
50,83
51,67
52,5
53,33
54,17
55,
55,83
56,67

I am, SIR,

Your moſt obedient humble ſervant,

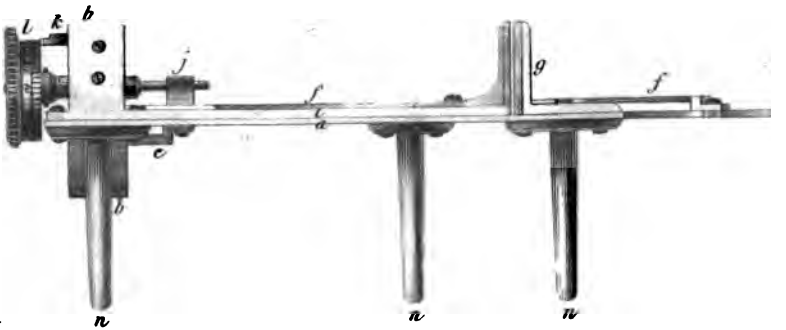
ROBERT HYNAM.

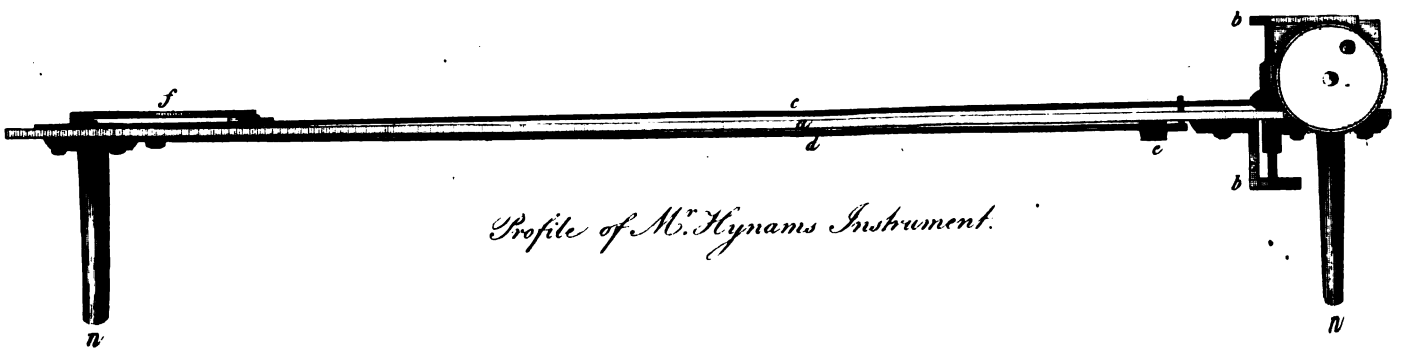
St. Peterſburgh, Jan. 20, 1797.

Mr. MORE.

Deſcription

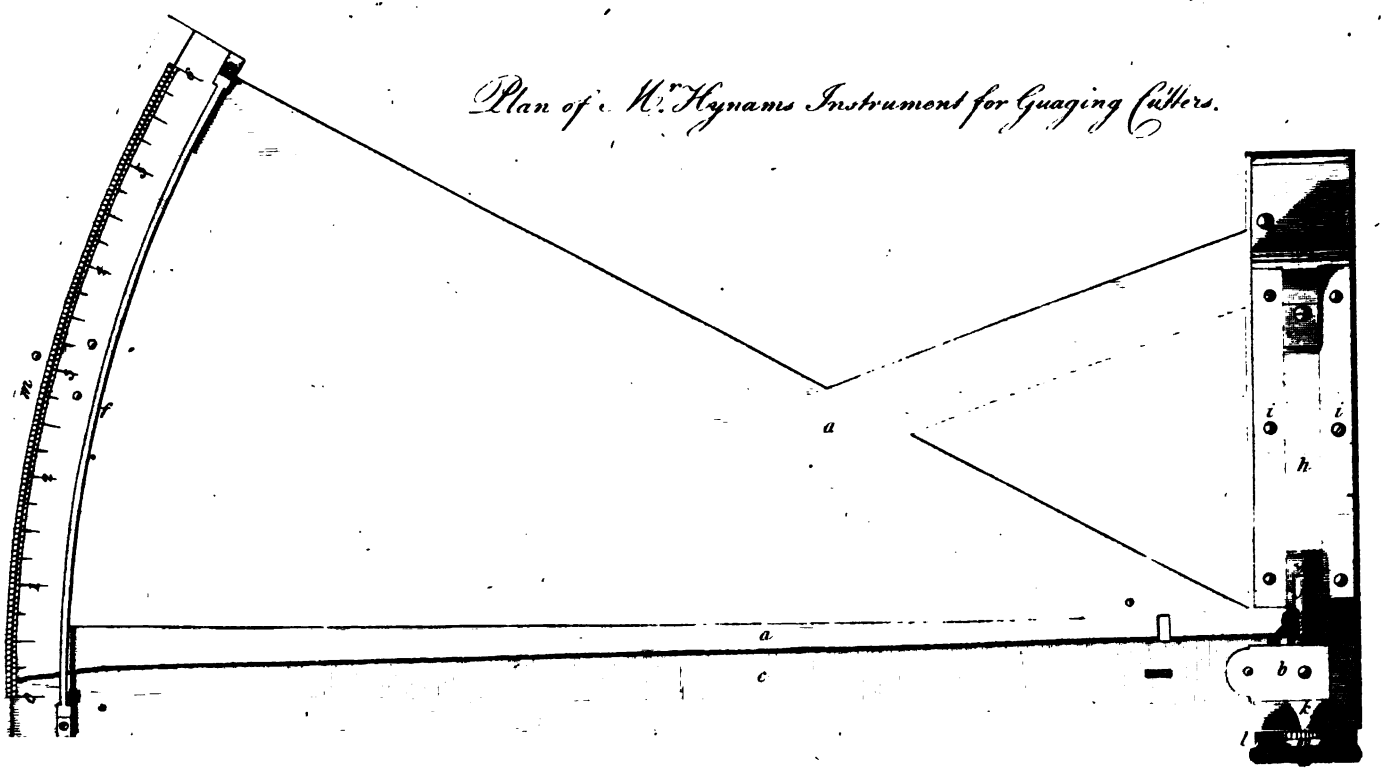
End View of M.r Hynams Instrument.





Profile of M.r Hynams Instrument.

Plan of Mr. Hynams Instrument for Guaging Cutters.



Deſcription of Mr. HYNAM's *Inſtrument for* GAUGING CUTTERS. *Plate I.*

a. The baſe on which all the work is fixed.

b. One of the cocks, there being two, which the index moves in, but the under one cannot be ſeen in the plate of the Plan.

c. The index, having under it a ſpring *d.* as ſhewn in Plate II.

f. A bridge over the point of the index.

g. A fixed cock to the baſe, with ſteel chop.

h. A dovetail: on one end is fixed a cock having a ſteel chop, which forms the gauge with *g.*

i. The ſides in which the dovetail moves.

j. A ſteel ſtud, tapped and fixed to the dovetail.

k. A cock fixed to the inſide of the cock *b.* through which paſſes the adjuſting ſcrew to the ſteel ſtud *j.*

l. The divided nut upon the adjuſting ſcrew.

m. A ſegment of a circle, divided into ſix parts in the Plan, each part containing forty diviſions, and being, on the Inſtrument at large, twelve inches in length.

The letters of reference to the ſeveral parts are the ſame in Plate II. as in Plate I. excepting that in Plate II. the two cocks marked *b*. and the bridge of the ſpring *d*. are ſhewn, which cannot be ſeen in Plate I.

n. The feet of the inſtrument.

A Bounty

A Bounty of SIXTY-FIVE POUNDS was this Seſſion voted to Mr. SIMON GOODRICH, for the application of a CRANK to anſwer the purpoſes of an Eſcapement in Clocks; of which a Deſcription and Print are hereunto annexed, and the Clock itſelf reſerved in the Society's Repoſitory, for the inſpection of the Public.

SIR,

I BEG leave to preſent to the Society for the Encouragement of Arts, Manufactures, and Commerce, for their inſpection, a Clock with the ſimple application of a Crank, as an eſcapement, to give motion to the pendulum.

The Clock does not appear in ſo ſimple a ſtate as it might, had the train been made on purpoſe for the invention, with all the wheels, and fewer of them in number, placed between the two plates, with the crank only behind the back plate: but I

was induced to apply the motion to a ready-made clock, in order to try, by the ſame machine, a point of which I had ſome doubts; namely, that perhaps, on account of the greater velocity of the acting part, this method might require more power than the common. The experiment proved in favour of the crank; though, with the common eſcapement well adjuſted, I kept the pendulum in motion for ſome days, with as ſmall a power as I could with the crank; yet the ſame ſmall power with the common eſcapement was not ſufficient to maintain the motion ſo long as it was with this crank. The weight here uſed for this eight-day piece, which has kept it going for about ſix months without once failing, is $4\frac{1}{4}$ lb. It has in it an allowance of more than half for the loſs of power from foulneſs or other accidents; for 2 lb. was ſufficient to work the clock for ſeveral weeks, when firſt put together.

That I may be enabled to refer to ſome particulars in this letter, I have incloſed a

ſketch

ſketch and deſcription of this invention. See the Plate.

The advantages of this Eſcapement are, firſt, ſimplicity of conſtruction, conſequently cheapneſs. It can eaſily be adopted by the manufacturers of the common wooden Dutch clocks, as the whole eſcapement can be formed of a few pieces of wire bent till properly adjuſted, without even the neceſſity of the adjuſting ſcrews I I. Therefore the benefits of this invention may extend even to the poorer part of the public.

2dly, Total ſilence when going; clocks being excluded by many perſons, to whom and from many places where uſeful, upon account of their noiſe.

3dly, Keeping good time, ariſing from this principle, that the crank always impels the pendulum in the ſame manner; that is, as it paſſes through the ſemicircle under its centre, always one way; and as it paſſes through the ſemicircle over its centre, always the other way; and it recurs in the ſame ſituation it ſet out from, after theſe

two

two impulſes, which being eaſily made equal by means of the adjuſting ſcrews, notwithſtanding the ſmall difference in length of the levers acted upon, all the ſucceeding impulſes muſt alſo correſpond with theſe, and be equal and regular, as far as regards the eſcapement itſelf. In other eſcapements, if any irregularity exiſts or is worn in any one or more of the teeth or pins in the ſcape-wheel, and the pallets or inclined planes they act againſt, the impulſes given to the pendulum cannot be equal and regular; and the higher the number of the ſcape-wheel, the greater this chance of imperfection.

4thly, Durability and great certainty of continuance. This Eſcapement does not require oil, which, as it becomes clammy and thick by the duſt, is the frequent and well-known cauſe of the ſtopping of others; it does not wear itſelf untrue and out of order. The friction of the collets upon the crank muſt be very ſmall, as the acting ſurface is ſmall, and as the intenſity of the impulſe upon the pendulum is in

proportion

proportion leſs in this, as it acts upon a longer lever than in others; alſo at the time that the chief force is exerted, as the crank paſſes over and under its centre, there is very little turning of the collets upon it: ſo that I judge this Eſcapement, properly made, ſtands a fair chance of laſting as long as the train itſelf without being out of order; which I underſtand is far from being the caſe with others.

The ingenious part of the Public can no doubt improve upon this application. Of the various methods I have tried, this appears to me the beſt for general uſe. I can ſend the Society drawings* of two other methods which I have tried, if by this they ſhould judge them worthy their notice. In the one, the crank, beſides its own, can be applied with all the advantages of a dead beat, and in the other of a detached eſcapement; but they will not have the advantage of ſilence.

I do

* The drawings here alluded to, as alſo a model of another Eſcapement, by Mr. Goodrich, are reſerved in the Society's collection.

I do not mean to ſecure this invention to myſelf by a patent: my intention, in preſenting it to the Society, is for the benefit of the Public, hoping at the ſame time, that if the Society find any merit in it, their bounty will be an encouragement to exertion in future, and at preſent ſome recompence for my expence and time; as my family and ſelf, which I have to maintain out of no more than journeyman's wages, do not permit me to undertake any thing of this kind without a proſpect of indemnification.

I can truly affirm this is my own invention; and if, in deſcribing it, I have miſſtated any thing, I hope the fault will be attributed to my want of judgement, and not to my intention.

I remain, SIR,

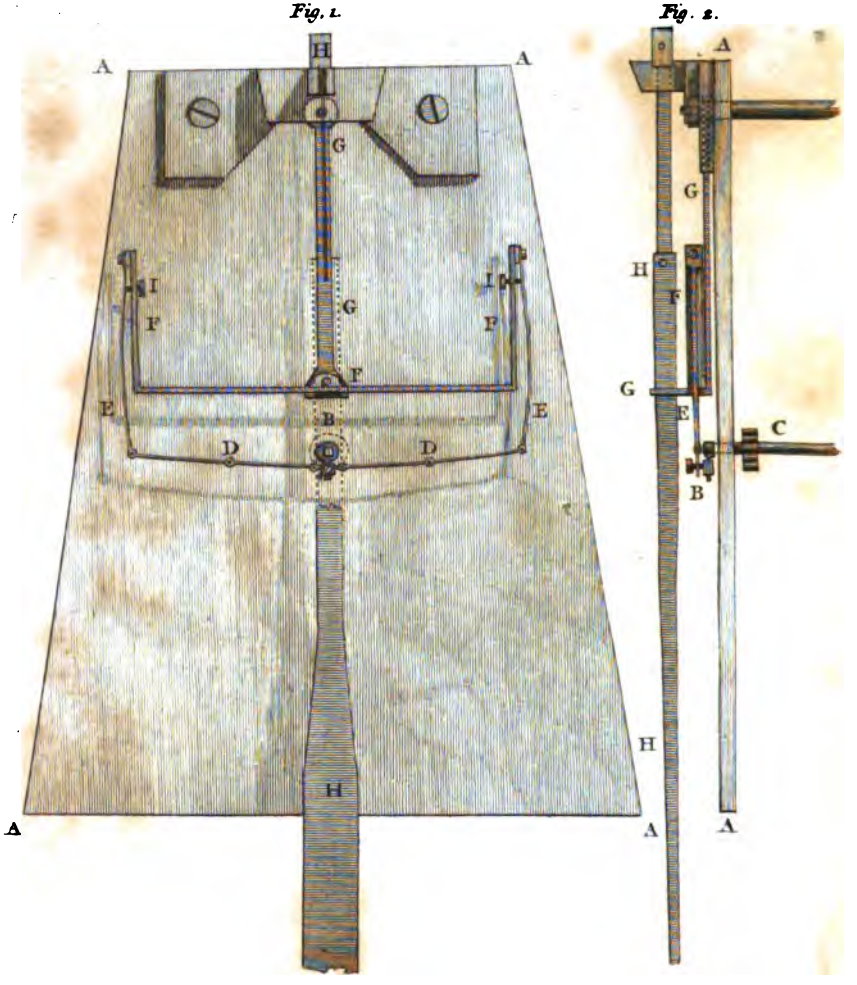
Your moſt obedient ſervant,

SIMON GOODRICH.

No. 3, *Canterbury Walk, Lambeth.*
Feb. 12, 1799.

Mr. MORE.

Fig. 1.



Mr. Simon Goodrich's Application of a Crank to answer the purposes of an Escapement in Clocks.

Fig. 1. A front view of the Crank Eſcapement.

Fig. 2. A ſide view of ditto.

The ſame letters of reference are put to the correſponding parts in each figure.

A A A A. The back plate of a Clock.

B. The crank fixed on the end of

C. The arbor of the laſt pinion of the train.

D D. Two ſmall wire chains compoſed of two links only, attached to the crank B by means of two collets, with plenty of liberty upon it. Theſe chains are faſtened to

E E. Two ſmall ſprings ſcrewed to

F F F. A bar that goes acroſs, and is faſtened in the middle to

G G. The crutch, with which

H H. The pendulum is ſuſpended in the common way.

I I. Are two ſcrews going through the bar F, the ends of which being made to act againſt

againſt the ſprings E E, ſerve to adjuſt them to a proper diſtance and degree of ſtrength, and by that means eaſily to put the pendulum in proper beat.

In *Fig.* 1. the pendulum is partly repreſented by dotted lines, in order to ſhew the crank, &c.

In

In conſequence of ſome trials made of a Method of TURNING SPHERICAL FORMS IN WOOD in a more expeditious Manner than uſually practiſed (a Deſcription of which Method is hereunto annexed), the Society this Seſſion voted a Bounty of TWENTY GUINEAS to Mr. THOMAS COOK, of Newington, Surrey; and ſeveral Samples ſo turned by him are reſerved in the Society's Collection, for the inſpection and information of the Public.

SIR,

HEREWITH you receive the method of preparing and turning a true round or ſpherical figure, between two centres, principally upon a large ſcale, by means of the large wheel commonly made uſe of by turners.

Prepare of wood as near a cube as may be; plane one ſide true, and gauge a line down

down the middle, from which line the centres are at each end found with a pair of compaſſes. Then form the piece to an octagon, by taking off the four corners; place it in the lathe, and lay the band on about one third from the end; then ſtrike each end to the exact length of the intended diameter. With a pair of compaſſes divide the piece which gives the centre or curve line, and biſects the gauge ſtroke; ſtrike it with a chiſſel, then with a ſmall gouge which makes a groove for the band to work in (taking care not to diminiſh the ſize of the diameter); from the middle work down each end with a gouge to as fair a round as you can by eye, or with the callipers: then take the piece out, and carefully prick the ſecond centres, which the gauge ſtroke and curve line give: place in the lathe the laſt pricked centres, and paſs the piece round by hand: work down with a ſmall firming chiſſel, in order to form a ſecond curve line, until it biſects the firſt diameter or curve line: then ſtrike the piece to the firſt centres

centers, and work off the remaining wood with a large firming chiſſel, until it becomes fluſh with the ſecond curve line: it may then be poliſhed. Throw off the band, and turn round the ball by hand to work off the groove the band played in. Should you not think fit to paſs the ball by hand, ſhift your reſt to the oppoſite ſide, and have the wheel turn the reverſe way; by this means you turn off the groove. To poliſh the remainder, the band will play on the ſurface of the ball, by being ſteadied with the hand.

I remain reſpectfully,

Your moſt obedient humble ſervant,

THOMAS COOK.

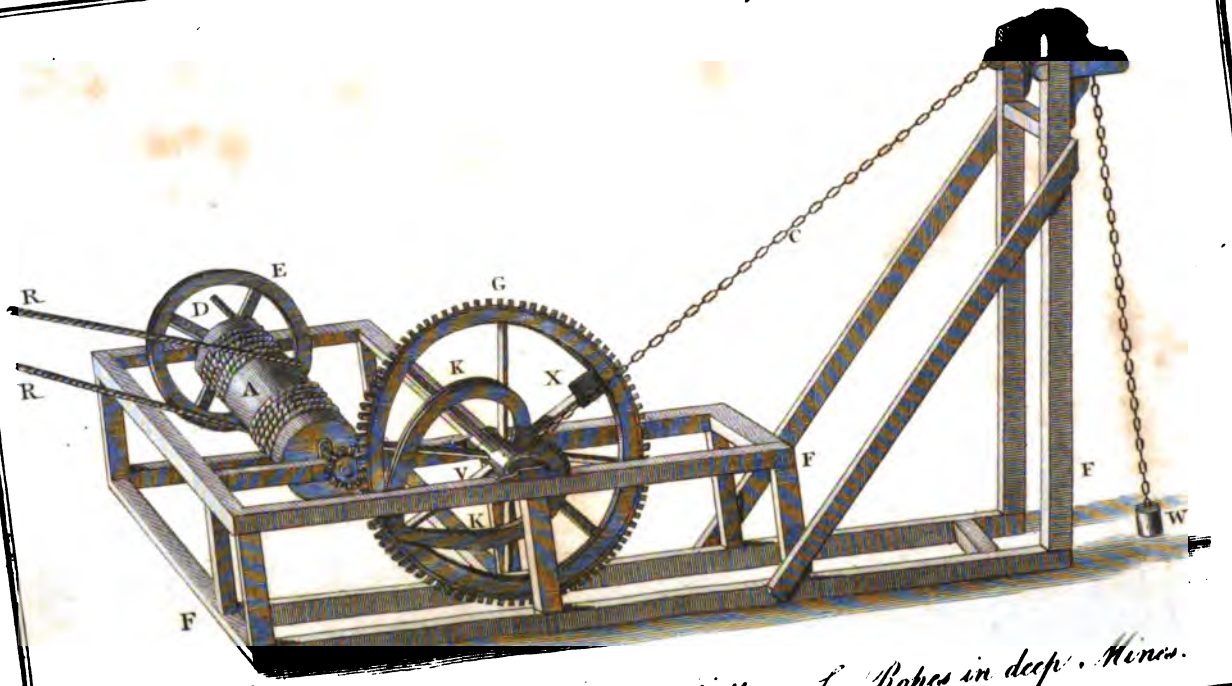
Newington, May 27, 1799.

Mr. MORE.

The Thanks of the Society, and the SILVER MEDAL, were this Seſſion voted to Mr. WILLIAM FEATHERSTONHAUGH, for the following Deſcription and Drawing, accompanied with a Model of a Machine invented by him for COUNTERBALANCING THE ROPES uſed in the DEEP SHAFTS OF MINES; which Model is reſerved in the Society's Repoſitory.

SIR,

THE beginning of laſt year I conſtructed a model of a counterbalance, for preſerving a conſtant equilibrium between the ropes uſed in machinery, wrought by ſteam engines or otherwiſe, for the purpoſe of raiſing coals, upon a plan which I had never ſeen or heard before, which I ſhewed to the proprietors of ſome extenſive coal-mines in this neighbourhood, who immediately got a large one conſtructed, which they



M.r Featherstonhaughs Counterballance for Ropes in deep Mines.

they continue to uſe and prefer to any of the other counterbalances erected in this country. A model of the above counterbalance I now beg leave to ſubmit to the inſpection of the Society, and ſhall be extremely glad if it appears to them of ſufficient utility to merit a deſcription in their tranſactions.

I am, SIR,

Your moſt obedient ſervant.

WM. FEATHERSTONHAUGH.

Lambton, near Cheſter-le-ſtreet,
Durham, April 14, 1798.

Mr. MORE.

SIR,

YOU will pleaſe to lay before the Society for the Encouragement of Arts, Manufactures, and Commerce, the following account of the advantage which I conceive

the counterbalance erected by me to have over thoſe already in uſe; with its dimenſions, &c. The beſt mode that I have ſeen adopted may be thus deſcribed. A chain is faſtened to the axis of the rope-barrel, which, paſſing over a pulley, deſcends into a pit, and is there faſtened to the end of a very heavy chain. When the ropes are in equilibrio, the large chain is at the bottom of the pit; but as the difference of their weights increaſes, the ſmall chain, winding upon the axis of the rope-barrel, lifts up the large one from the bottom of the pit, till it is ſuſpended at full length, at which time one corf has aſcended to the top of the ſhaft. One diſadvantage attending this counterbalance is the depth of the pit for the chain to deſcend into. I meaſured the depth at a machine, upon a colliery belonging to Sir Henry Tempeſt Vane, Bart. and found it to be fourteen fathoms, meaſured from the axis of the pulley to the bottom; the depth of the ſhaft being eighty-eight and a half fathoms.

At

At Heaton colliery, near Newcaſtle-upon-Tyne, the owners thereof expended near two hundred pounds, in attempting to ſink a pit for the counterbalance chain, but which they could not get ſunk deeper than three and a half fathoms, on account of water; they therefore fixed the pulley five fathoms from the top of the pit, making the whole length of ſpace for the chain to move in, eight and a half fathoms. They have lined the pit near the bottom with metal plates, to prevent the chain wearing away the ſides. I think the chain muſt ſuffer much by friction. The counterbalance which I erected is ſtill uſed at a coal-pit in Harraton colliery, ſituated about two miles from Cheſter-le-ſtreet, and belonging to the truſtees of the late William Henry Lambton, Eſq. The depth of the pit for the counterbalance is five fathoms, meaſured from the axis of the pulley to the bottom. The weight ſuſpended at the end of the chain is thirty one and a half hundred weight; diameter

of the wheel, fifteen and a half feet; depth of the ſhaft, ſeventy-ſix and a half fathoms; and weight of ſeventy-ſix and a half fathoms of rope, five hundred weight two quarters. Another diſadvantage attending the counterbalance firſt deſcribed is, that it does not regularly take off the weight of the heavier rope, which will appear by conſidering that, immediately after the corves have paſſed each other in the ſhaft, and the difference of the weights of the ropes very ſmall, the leſſer chain is acting very powerfully upon the axis, which is of an equal diameter in each part whereon the chain winds. According to my plan, there is an irregularity occaſioned by the weight of the chain, but it is very trifling. One inconvenience which may poſſibly attend the counterbalance I invented is, that as the engine-men, through inattention, ſometimes draw a corf over the pulley above the ſhaft, the weight at the end of the chain may be drawn too high, and ſome part of the machinery broken; but during a year

and

and a quarter's conſtant uſe of this counterbalance, the engine-man, though he has ſometimes drawn a corf over the pulley, has always been able to ſtop the machine before any accident happened. It would conſiderably diminiſh the friction, to fix the large wheel nearly in a horizontal poſition, with bevel teeth, ſo that its weight might reſt almoſt entirely on one end of the axis. The counterbalance formerly uſed at Harraton colliery is on the following conſtruction. A large wheel, with a weight fixed therein, near to its circumference, is placed directly above a pinion on the end of the rope barrel: when the ropes in the ſhaft balance each other, the weight is at reſt; but the machine being put in motion, the pinion turns the large wheel, and the weight aſcends till it has deſcribed a quadrant of a circle, at which time its power is the greateſt, and one rope has reached the top of the ſhaft. This counterbalance does not act uniformly, and its power is very ſmall. There has been a counterbalance erected at Heaton colliery, about fourteen

or fifteen weeks ago, by Mr. Jeffreys, an engineer, near Newcaſtle-upon-Tyne, on nearly the ſame conſtruction as mine; the principal difference being, that in his the chain hangs directly from the wheel, and the weight moves in a gutter. Mr. Jeffreys ſays, he never had an opportunity of bringing it into uſe before; but was ſhewn a model of it above ſix years ago, by a perſon of the name of Crowther, who I ſuppoſe is employed under him. When I recommended the new counterbalance to be erected at Harraton, the proprietors were uſing the old one deſcribed above, having the large wheel directly over the pinion. They made the improvement without taking down the large wheel; and on account of its being in rather a bad ſtate, they have not much more than one ton weight ſuſpended at the end of the chain.

I am, SIR,

Your moſt obedient ſervant,

WM. FEATHERSTONHAUGH.

Lambton, near Cheſter-le-ſtreet,
November 30th, 1798.

Mr. MORE.

WE the underſigned, being the managers of Lambton, Harraton, Bourn Moor, Lumley, Murton and Penſhaw collieries, and two of the proprietors of the machinery erected thereon for the purpoſe of drawing coals, do certify that we have uſed about fifteen months a counterbalance recommended by Mr. William Featherſtonhaugh. It is the beſt method that has ever been propoſed to us, and we believe it to be his own invention.

T. CROUDACE.

M. FEATHERSTONHAUGH.

THIS is to certify that I conſtructed a counterbalance laſt year for Meſſrs. Featherſtonhaugh, Fenwick, and Croudace, according to a model ſhewn me by Mr. Wm. Featherſtonhaugh. I have endeavoured to compare the expence of a counterbalance on his plan with that of a counterbalance by means of a large chain for the depth of ſeventy-

ſeventy-ſix and a half fathoms, and am of opinion that there will be little difference in the firſt coſt. In caſe there is much water, the latter method will be a great deal more expenſive. I think his counterbalance may be upholden and replaced at new pits, for leſs expence. I believe the invention to be new, as I never heard of it before.

JACOB WEATHERBURN.
Engine-wright.

A Deſcription

A Deſcription of the Plate repreſenting the Counterbalance invented by Mr. WM. FEATHERSTONHAUGH.

F F F Are the different parts of the framing. A ſteam-engine is ſuppoſed to turn the barrel A by means of a crank at the end D. E is a fly wheel. R R are the ropes which deſcend into the mine. When the engine is put in motion, the barrel A revolves, and, by means of a pinion on the end of its axis, turns the wheel G; the chain C, with a weight W at the end, winding upon one of the curves K K, which are formed of pieces of timber ſtrongly faſtened to the arms of the wheel G, and in which grooves are cut to prevent the chain from ſlipping off. The teeth of the wheel and pinion are of caſt iron. A pit muſt be dug for the weight W to deſcend into, but it need only be of a very ſmall depth; whereas, in the beſt counterbalances which I have ſeen, a pit of conſiderable depth is neceſſary, in the ſinking of which, in ſome inſtances, when there has been much water, I have known

known a very large ſum expended. When the wheel G has revolved ſo far that the chain makes a right angle with the arm V, at the extremity thereof; it then acts with its greateſt power, and the difference of the weights of the ropes is the greateſt. The curves K K were attempted to be drawn of ſuch a form, that as the wheel G revolved, a perpendicular let fall from its centre upon the line of direction of the chain might uniformly increaſe; but according to the method in which I have applied the chain, it could not be done perfectly exact. X is a weight to balance the curved pieces of timber on the oppoſite ſide of the wheel. Where there are ſeveral ſtrata of coal in one pit, if a counterbalance be calculated for the deepeſt, it will anſwer for the reſt without alteration. Where the depth is very great, two counterbalances may eaſily be applied; or the power of this counterbalance may be encreaſed by making the ſpiral-ſhaped pieces of timber extend beyond the circumference of the wheel.

The

The Thanks of the Society were this Seſſion voted to Sir THOMAS HANMER, Bart. for the following Account and Drawing of a Method of LAYING ON WATER UPON WATER-WHEELS, as practiſed by him in Flintſhire.

SIR,

THE old method of conveying water from a higher level to an overſhot mill wheel, proving ſo deſtructive to the different timbers and working gear of all mills of this deſcription, by the ſplaſhing and beating of the water overflowing the buckets, its extreme waſte of water, and the retrogade manner in which the water is diſcharged from the bucket cauſing rather a ſtagnation in the water under the wheel, where the fall is not very great; and floods are very apt to dam or tail-back, and thereby impede or clog the regular motion of the wheel; have induced the proprietor to try the following plan hereunto annexed, and which

which has been adopted at an overſhot corn-mill in Flintſhire, with the aſſiſtance of Mr. John Wilkinſon, Iron-maſter, of Birſham Forge, Denbighſhire.

A. The line of high-water level.

B. The iron ciſtern.

C. The valve to the ciſtern.

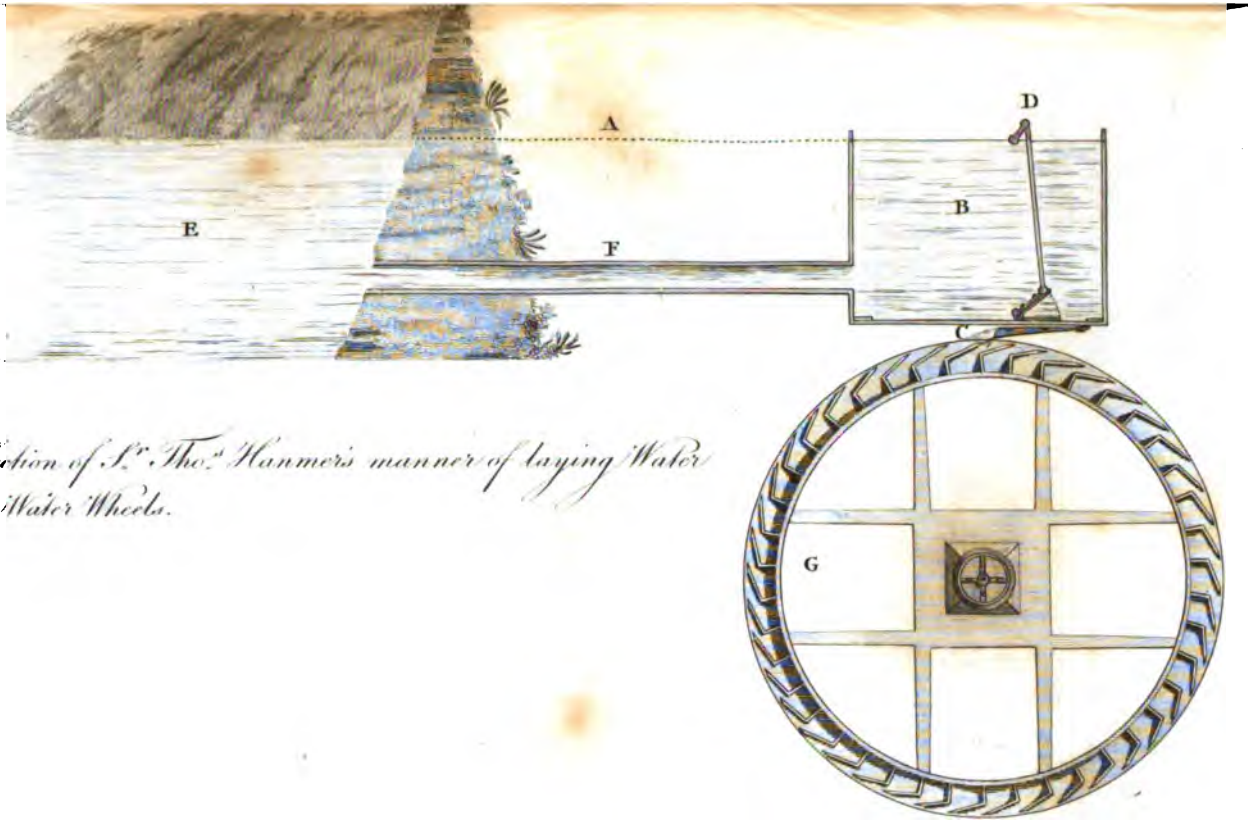
D. The lever that lets the water on the wheel.

E. The pool dam.

F. The iron pipe, through which the water is conveyed from the pool to the ciſtern.

G. The large wheel.

By the delivering the water from a valve in the ciſtern, which is of caſt iron, a little beyond the centre of the wheel, you are able to obtain the motion of an underſhot wheel without the loſs of any water or injury to the mill-work by perpetual ſplaſhing, as by the old method. There is a great ſaving of water by this plan, ſo as to enable the mill to do nearly double the work



Section of Sr. Thos Hanmer's manner of laying Water on Water Wheels.

work with the ſame ſupply of water, compared with what it did in the old way. The motion is quicker, and the wheel rids itſelf with greater eaſe, and the water paſſes off with great rapidity, and acts with greater power againſt floods and froſts: the whole of the wheel and ciſtern ſhould be covered from the weather: the bore of your pipe may be of any dimenſions, according to your ſupply of water. It was completed at Hanmer in 1797; and from its ſucceſs, the proprietor is induced to give a plan and ſection to the Public, and to lay it before the Society for the Encouragement of Arts, Manufactures, and Commerce, for their information; not doubting, from the ſucceſs he has experienced, that if more frequently adopted, it may admit of conſiderable improvement, and be of great utility.

I am, SIR,

Your obedient ſervant,

THOMAS HANMER, Bart.

Bettiſfield Park, May 27, 1798.

Mr. MORE.

PAPER

IN

COLONIES AND TRADE.

COLONIES AND TRADE.

The Society this year received the following Paper and Certificates in claim of the Premium, being the GOLD MEDAL, offered for the cultivation of the BREAD-FRUIT TREES in the Weſt Indies; but the Candidate not having fully complied with the terms ſpecified in the Advertiſement, no Sample of the Fruit having been ſent as required, he could not be conſidered as entitled to the Premium offered; yet in conſideration of his merit, as being the firſt Claimant for this Premium, he was preſented with the SILVER MEDAL and TWENTY GUINEAS.

ARCHIBALD M'LIESH, now in the ſervice of Samuel Mure, Eſq. on Williamsfield Penn, in the pariſh of St. Elizabeth, Iſland of Jamaica, declares that he planted within a ſtrong encloſure, formed of a ſtone wall four feet and a half in height,

which takes in an area of about three acres and a half on the ſaid ſettlement, one hundred and one Bread-Fruit trees; the original plants of which were brought from Otaheite, and put in the ground from the 17th Oct. 1797, and continued to be ſupplied with freſh plants until 1ſt Jan. 1798; the whole of which number of Bread-Fruit plants are now in a moſt thriving and flouriſhing ſtate.

ARCHIBALD M'LIESH.

Williamsfield, Aug. 10, 1798.

I CERTIFY, that I ſaw the above-mentioned plantation of Bread-Fruit trees, and inſpected them with great attention; and that the above declaration, as to the numbers growing in a thriving and flouriſhing ſtate, and the fence by which they are encloſed, is genuine and authentic.

ROBERT BRERETON,
Major-General of Militia, Iſland of Jamaica.

I believe the above to be a fair and juſt ſtatement.

BALCARRAS, Lt. Gov.

Archibald M'Lieſh has diſtributed about three hundred and fifty plants of the Bread-Fruit to gentlemen of eſtates, at the diſtance of forty or fifty miles from him, and has upwards of two hundred more to diſtribute, beſides thoſe mentioned in the certificate.

The method of cultivating the Bread-Fruit Trees is as follows:

By ſuckers and layers; and alſo by cutting off the ſmall roots of one quarter of an inch to one inch and a half diameter, and about five inches in length, from trees that bear fruit, which muſt be planted, the ſmall end downwards, and the thick end about half an inch above the ſoil; and in ten months they may be tranſplanted.

The trees arrive at the greateſt perfection in a rich loamy ſoil, and require great heat and moderate moiſture.

ARCHIBALD M'LIESH.

REWARDS

BESTOWED BY THE

SOCIETY,

From October, 1798,

To June, 1799.

REWARDS

BESTOWED IN

AGRICULTURE.

Claſs 50. TO THOMAS PAGE, of Ely, Eſq. for having planted ſeven and a half acres with Oziers, in the year 1798, the GOLD MEDAL. See page 140.

Claſs 88. To Mr. ROBERT DUDGEON, of Tillingham, near Dunbar, for having cultivated upwards of twenty-three acres with Wheat after Beans, in the year 1797, Twenty Guineas. See page 144.

Claſs 93. To Mr. WILLIAM SEATON, of Tilgate, Suſſex, for having cultivated ſix acres of land with Potatoes,

for

for feeding Cattle and Sheep, THIRTY GUINEAS. See page 160.

To JOHN MIDDLETON, of Lambeth, Eſq. for various experiments on different kinds of Manure, the SILVER MEDAL. See page 231.

To THOMAS WAKEFIELD, of Liverpool, Eſq. for experiments on making Hay in Wet Weather, the SILVER MEDAL. See page 226.

To the Rev. HENRY JEROME DE SALIS, D. D. of Wing, Herts, for obſervations on the uſe of Parſneps in feeding Cattle and Sheep, the SILVER MEDAL. See page 256.

Claſs 90. To MATTHEW FORSTER, of Broomyholme, near Cheſter-

Cheſter-le-ſtreet, Eſq. for Obſervations on the comparative Culture of Turneps, the GOLD MEDAL. See page 240.

Claſs 104. To Mr. ROBERT BELL, of Huntſhill, near Jedburg, North Britain, for having improved four hundred and ſixty-eight acres of Land lying waſte, the SILVER MEDAL and TWENTY GUINEAS. See page 166.

Claſs 105. To Mr. JOHN FOX, of Boxhill, Surrey, for having improved one hundred and ſeventy-two acres of Land lying waſte, the SILVER MEDAL and TEN GUINEAS. See page 216.

IN POLITE ARTS.

Claſs 173. To Mr. CHARLES HENRY PARRY, of Bath, for a Drawing, Portrait of his Brother,

brother, in the character of a Shepherd Boy ſtruggling with a Ram, the SILVER MEDAL.

Claſs 175. To Mrs. MARY ROSE ROBINSON, Piccadilly, for a Drawing, Banditti at Market, after a deſign by Mortimer, the SILVER MEDAL.

Claſs 177. To Mr. JOHN JAMES MASQUERIER, No. 41, Tottenham Street, for a Drawing of the Statue of Joſhua Ward, Eſq, in conformity to the Will of John Stock, of Hampſtead, Eſq. the SILVER MEDALLION.

Claſs 180. To Mr. HENRY MILBOURNE, No. 38, Alſop's Buildings, Mary-le-Bone, for a Drawing of a Landſcape, View of Llanwrſt-Bridge, the GREATER SILVER PALLET.

To

Claſs 182. To Mr. STEPHEN FRANCIS RIGAUD, for an Hiſtorical Drawing, of Venus wounded by Diomed, the GOLD PALLET.

To Miſs FRANCES TALBOT, aged ſixteen, for a Painting after Raphael, the Virgin and Child, the SILVER MEDAL.

To Miſs CATHARINE MARY CRAUFURD, for a Drawing after a Caſt in plaſter, the Centaur Neſſus and Dejanira, the LESSER SILVER PALLET.

To JAMES BARRY, Eſq. in teſtimony of his public zeal and eminent abilities, manifeſted in the ſeries of Pictures in the Great Room of the Society, the GOLD MEDAL and TWO HUNDRED GUINEAS.

To

To Miſs KNIGHTS, for Buſts in Clay and Plaſter, hardened, the GREATER SILVER PALLET. See page 302.

To Mr. F. NICHOLSON, for diſcovering his Proceſs for producing the lights in ſtained Drawings, TWENTY GUINEAS. See page 296.

IN MECHANICKS.

To Mr. THOMAS COOK, of Newington, Surrey, for his eaſy and commodious method of turning Spheres, TWENTY GUINEAS. See page 335.

To Mr. SIMON GOODRICH, of Lambeth, for his new-conſtructed Clock with a Crank in place of an Eſcapement, SIXTY-FIVE POUNDS. See page 327.

To Mr. WM. FEATHERSTONHAUGH, of Cheſter-le-

le-ſtreet, Durham, for his method of counterbalancing the Ropes uſed in the deep Shafts of Mines, the SILVER MEDAL. See page 338.

To Mr. ROBERT HYNAM, of St. Peterſburgh, for his ingenious method of gauging Cutters for Wheels for Clock and Watch Makers, exemplified by an Inſtrument, Drawings, and various laborious calculations, the GOLD MEDAL. See page 307.

IN COLONIES AND TRADE.

Claſs 219. To SAMUEL MURE, Eſq. of Williamsfield Penn, in the pariſh of St. Elizabeth, in the Iſland of Jamaica, for his having made a Plantation of one hundred and one Bread-Fruit Trees, the SILVER MEDAL and TWENTY GUINEAS. See page 355.

PRESENTS

PRESENTS

RECEIVED BY THE

SOCIETY,

SINCE THE PUBLICATION OF THE SIXTEENTH VOLUME OF THESE TRANSACTIONS.

With the names of the DONORS.

BOOKS.

The ROYAL SOCIETY.

THE ſecond part of the 88th, and firſt part of the 89th Volume, of the Philoſophical Tranſactions.

The SOCIETY of ANTIQUARIES.

An Account of the Abbey Church of Bath, illuſtrative of the plans, elevations, and ſections of that Building.

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The firſt Number of the Second Volume of Prints of various Plants, the produce of the Coaſt of Coromandel.

The Right Honourable Sir JOSEPH BANKS, Bart. P. R. S.

A Pamphlet, entitled a Narrative of the ſucceſsful manner of cultivating the Clove Tree in the Iſland of Dominica, by William Urban Buce, Eſq.

Sir JOHN ANSTRUTHER, Bart.

A Pamphlet, entitled, Additional Remarks on Hoeing, Huſbandry, &c.

Dr. JAMES ANDERSON.

The five firſt Numbers of a Work, entitled, Recreations in Agriculture, Natural Hiſtory, Arts, and Miſcellaneous Literature. To be continued.

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A Pamphlet, entitled, Deſcrizione del nuovo Rimedio curativo et preſervativo contro la Peſte.

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The 53d, 54th, 55th, and 56th, Numbers of the Repertory of Arts and Manufactures.

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A Pamphlet, entitled, a Preſervative Plan, or Hints for the Preſervation of Perſons expoſed to thoſe Accidents which ſuddenly ſuſpend or extinguiſh Vital Action, &c.

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The SECRETARY.

A Pamphlet, entitled, Propoſals for forming a Public Inſtitute, by Count Rumford.

PRINTS.

Mr. SHARP.

The Portrait of Mr. John Hunter; St. Cecilia; Two of Diogenes, one, a proof; Head of Chriſt; Virgin and Child; Holy Family, and Sortie at Gibraltar.

DRAWING.

Mr. SABBATIER.

A Drawing of an Apparatus for preſſing Cotton.

A LIST

A

CATALOGUE

OF THE

MODELS AND MACHINES

Received since the Publication of the Sixteenth Volume of the Society's Transactions, with the Numbers as they are arranged in the Class to which they belong.

MECHANICKS. CLASS IV.

No. CLXXIV. A MACHINE for gauging Cutters, by Mr. Robert Hynam, for which the Gold Medal was voted to him. See page 307.

CLXXV. A Clock, by Mr. Simon Goodrich, for which he received a Bounty of Sixty-Five Pounds. See page 327.

CLXXVI. A Model of a Dead-Beat Eſcapement, accompanied by two explanatory Drawings, by Mr. Simon Goodrich.

CLXXVII. A large wooden Sphere, with ſeveral ſmaller ones, turned in a Lathe, according to the method deſcribed by Mr. Thomas Cook, for which he received a bounty of Twenty Guineas. See page 335.

CLXXVIII. A Model of a Machine for counterbalancing the Ropes uſed in the deep Shafts of Mines, by Mr. Wm. Featherſtonhaugh, for which he received the Silver Medal. See page 338.

A LIST

A LIST

OF THE

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AND

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Elected March 22, 1799.

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A

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Allix, John Peter, Eſq. *Swaffam-houſe, Cambridgeſhire*
Anderſon, David, Eſq.
Andrews, Magnus, Eſq. *Piccadilly*
Angerſtein, John Julius, Eſq. *Pall-mall*
P Anneſly, Honourable Richard, Eſq. *Dublin*
P Antrobus, Edmund, Eſq. *New-ſtreet, Spring-gardens*

Arbuthnot,

Arbuthnot, George, Eſq. *King-ſtreet, Golden-ſquare*
Arkwright, Richard, Eſq. *Cromford, Derbyſhire*
Armſtrong, Mr. John, *Pimlico*
Armſtrong, the Rev. William, *Percy-ſtreet*
P Aſhby, Shuckbrugh, Eſq. F. R. S. *Great Ormond-ſtreet*
Aſhby, Henry, Eſq. *Chatham Place*
Aſhton, Nicholas, Eſq. *Woolton Hall, near Liverpool*
Aſhton, Mr. Iſaac, *Billiter-lane*
Aſlet, Mr. Robert, *Ludgate-ſtreet*
Aſtle, William Thornton, Eſq. *Clapham*
††Atcheſon, Nathaniel, Eſq. *Ely-place*
††Atlee, Mr. John, *Wandſworth*
Atlee, Mr. James, *Thames-ſtreet*
††PAubert, Alexander, Eſq. F. R. and A. S. *Auſtin-friars*

B.

P Bedford, Francis Duke of
**Buccleugh, Henry Duke of
P Bute, John Earl of, F. A. S.
P Buchan, David Earl of, LL. D. F. R. and A. S.
Briſtol, Right Rev. Frederick Earl of, F. R. S.
P Beverley, Algernon Earl of
P Brownlow, Lord, F. R. and A. S.
Bradford, Henry, Lord, *Weſton, Salop*
Braybrooke, Richard Lord

Bolton,

Bolton, Thomas Lord, F. A. S.
P Balgonie, Lord
P Bouillon, Prince of, Philip D'Auvergne, Captain in the Royal Navy, F. R. and A. S.
P Barrington, Honourable Daines, F. R. and A. S. *Temple*
Bruhl, His Excellency Count de, *Old Burlington-ſtreet*
Bruce, the Honourable Major-General, M. P.
Bowes, the Honourable George
Bowes, the Honourable Thomas
Berchtold, Honourable Count, *Prague, in Bohemia*
P Blacket, Sir Thomas, Bart.
Banks, the Right Honourable Sir Joſeph, Bart. Preſident of the Royal Society, K. B. and F. A. S. *Soho-ſquare*
Baring, Sir Francis, Bart, M. P. *Devenſhire-ſquare*
Burgeſs, Sir James Bland, Bart. *Duke-ſtreet, Weſtminſter*
Bruce, Governor James
Bacon, John, Eſq. R. A. *Newman-ſtreet*
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Bailey, Mr. James, Surveyor, *Lambeth*
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††Baker, John, Eſq. *Princes-ſtreet, Spitalfields*
P Baker, William, Eſq. *ditto*
Balfour, John, Eſq.
Balmanno, John, Eſq. *Pump-court, Temple*

Bancroft,

Bancroft, Edward, M. D. and F. R. S. *Francis-ſtreet, Tottenham-court-road*

P Barclay, David, Eſq. *Red-lion-ſquare*

* Barclay, Robert, Eſq. F. L. S. *Terrace, Clapham*

* Barclay, Robert, Eſq. *Lombard-ſtreet*

Baring, John, Eſq. M. P. *Devonſhire-ſquare*

Barker, Richard, Eſq. *Taviſtock-ſtreet, Bedford-ſquare*

Barker, Mr. Charles, *Chandos-ſtreet*

P Barnard, William, Eſq. *Deptford*

P Barnard, Edward, Eſq. *ditto*

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Barnard, Joſiah, Eſq. *Cornhill*

††Barnardiſton, Nathaniel, Eſq. *Harpur-ſtreet*

Barnet, Edward, Eſq. *Soho-ſquare*

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P Bean, Mr. Iſaac, *ditto*

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Bearcroft, Edward, Eſq. *South Lambeth Place*

Beatſon, Robert, Eſq. *Kilrick, Scotland*

Beaumont, Albanus, Eſq. *Kingſton, Surry*

Beaumont,

Beaumont, Daniel, Eſq. *Great Ruſſel-ſtreet*

††Beard, John, Eſq. F. A. S. *Doctors-commons*

Beazely, Charles, Eſq. *Blackfriars-road*

Beddall, Mr. John, *Jekyls, Fenchingfield, Eſſex*

Beliſario, Mr. John, *Gerard's Croſs, Bucks*

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Bell, William, Eſq. *Norfolk-ſtreet, Strand*

Bell, Mr. Anthony, *Charlotte-ſtreet, Pimlico*

Belſches, Robert, Eſq. *St. James's Place*

Bennett, James, Eſq. *Bedford-ſquare*

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Bent, Ellis, Eſq. *Warrington*

Bent, Mr. William, *St. Martin's-lane*

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Bentley, Cumberland, Eſq. *Abingdon-ſtreet*

††Benwell, Joſeph, Eſq. *Batterſea*

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Berger, Mr. Lewis, jun. *Bow-lane, Cheapſide*

Berwick, Joſeph, Eſq. *Hollow-park, near Worceſter*

Biddulph, Robert, Eſq. M. P. *Arlington-ſtreet*

Bignell, William, Eſq. *Seething-lane*

Bingley, Thomas, jun. Eſq. *Birchin-lane*

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††Birkhead, Charles, Eſq. *Ryegate, Surry*

Biſhop, Nathaniel, Eſq. *Yorkſhire*

Biſſet, Capt. Robert, Commiſſary-General, *Great Pulteney-ſtreet*

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Blaauws, William, Eſq. *Queen-Ann-ſtreet Weſt*
††Blades, John, Eſq. *Ludgate-hill*
Black, Mr. George, *Princes-ſtreet, Bank*
Blackburne, John, Eſq. M. P. F. R. S. *Park-ſtreet, Weſtminſter*
Blair, Alexander, Eſq. *Wimpole-ſtreet*
††Blake, William, Eſq. *Alderſgate-ſtreet*
Blane, William, Eſq. F. R. S. *Arlington-ſtreet*
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Blomefield, Colonel, *Shooter's-hill*
Boddington, Thomas, Eſq. *Mark-lane*
P Boehm, Edmund, Eſq. *Broad-ſtreet*
Boddy, Mr. Francis, *Warwick-lane*
Boddy, John, Eſq. *Thames-ſtreet*
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Boſtock, Samuel, Eſq. *Borough*
P Boſville, William, Eſq. F. R. S. *Gunthwaite Hall, Yorkſhire*
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††Bowzer, Richard, Eſq. *near St. John's Church, Southwark*

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Brettingham, Robert, Esq. *Berkeley-square*
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Brickwood, Mr. Nathaniel, *Thames-street*
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††P Broadhead, Theodore Henry, Esq. F. A. S. *Portland-place*
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††Brodie, Alexander, Esq. *Carey-street*
Brodie, John, Esq. *Clifford's-inn*
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Brounlie, John, M. D. *Carey-street, Lincoln's-inn*

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Brown, Thomas, Eſq. *Adelphi*

Brown, Mr. George, *Southampton-row, Tottenham-court-road*

Brown, Jonathan, Eſq. *Buckingham-ſtreet*

Browne, Iſaac Hawkins, Eſq. M. P. F. R. S. *South Audley-ſtreet*

Browne, Francis John, Eſq. M. P. *Cavendiſh-ſquare*

Browne, George Howe, Eſq. *Bedford-ſtreet, Covent-garden*

Browne, Mr. Robert, *Kew*

Brudenell, George Bridges, Eſq. *Great George-ſtreet, Weſtminſter*

Bryer, Mr. Robert, No. 58, *Strand*

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Buckell, George, Eſq. jun. *Chepſtow, Monmouth-ſhire*

Buller, John, Eſq. *Morval, Cornwall,* and *Glouceſter Place, Portman-ſquare*

Bullock, John, Eſq. *Tower*

Burdon, Mr. William, *Chatham-ſquare*

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†† Byfield, George, Eſq. *Craven-ſtreet*

C.

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Cremorne, Thomas Lord Viſcount
††Chetwynd, Richard Lord Viſcount
Couï, Charles Marquis de
Conyngham, Right Honourable William, F. A. S.
Cavendiſh, Hon. Henry, F. R. and A. S. *Gower-ſtreet, Bedford-ſquare*
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Cochrane, the Honourable John, *Harley-ſtreet*
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Coghill, Sir John, Bart.
P Carnegie, Sir David, Bart, M. P.
Cathcart, Sir Andrew, Bart.
Campbell, Governor William
Cairns, Thomas, Eſq. *Martin's-lane, Cannon-ſtreet*
††Caley, John, Eſq. F. A. S. *Gray's-inn*
Callender, John, Eſq. M. P.
Caldecott, John, Eſq. *Rugby, Warwickſhire*
Campbell, Duncan, Eſq. *Adelphi*
Campbell, Archibald, Eſq. *Argyll-ſtreet*
Camper, Peter Everard, Eſq. *Devonſhire-ſtreet, Portland-place*
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Carden, James, Eſq. *John-ſtreet, Adelphi*
Carew, Reginald Pole, Eſq. M. P. F. R. and A. S. *Charles-ſtreet, Berkeley-ſquare*

Cartwright,

Cartwright, Charles, Eſq. *India-houſe*
Cartwright, Rev. Edmund, *Marybone Park*
Caſſon, William, Eſq. *Saliſbury-court*
†PCater, Mr. Richard, *Bread-ſtreet, Cheapſide*
Chadwick, Thomas, Eſq. *Hampton, Middleſex*
Chalie, John, Eſq. *Bedford-ſquare*
Chambers, Chriſtopher, Eſq. *Mincing-lane*
Champernoun, John, Eſq. *Totneſs, Devon*
Chandler, Henry John, Eſq.
Charington, John, Eſq. *Mile-end*
Cherry, Benjamin, Eſq. *Hertford*
Chippendale, Mr. Thomas, *St. Martin's lane*
Chriſtie, Daniel Beat, Eſq.
Chriſtian, John Giles, Eſq. *Doctors-commons*
Claridge, John, Eſq. *Upton-on-Severn, Worceſter-ſhire*
Clarke, Richard, Eſq. *Lawn, South Lambeth*
P Clark, Mr. James
††Clarke, Richard, Eſq. Chamberlain, *Bridge-ſtreet, Blackfriars*
Clark, Ralph, Eſq. *Robert-ſtreet, Adelphi*
Clarke, Mr. Henry, *Gracechurch-ſtreet*
Clarke, Richard, Eſq. *Worceſter*
Clarke, John, Eſq. *Albemarle-ſtreet*
Clarke, William, Eſq. *Tynemouth, Northumberland*
Clark, James, Eſq. M. D.
Clark, John George, Eſq. *Lincoln's-inn*
Clay, Henry, Eſq. *Birmingham*
† Cleland, Walter, Eſq. *Adelphi Terrace*

Clephane, Colonel William Macleane
Cloſe, Rev. Henry John, *Ipſwich*
Cole, Benjamin, Eſq. *Batterſea-riſe, Surrey*
Cole, Robert, Eſq. *Windſor*
Coleman, Edward, Eſq. Profeſſor at the Veterinary College
P Colen, Joſeph, Eſq. Governor of York Fort, *Hudſon's Bay*
Collier, Mr. Joſhua, *Little Buſh-lane, Upper Thames-ſtreet*
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Collins, Benjamin Charles, Eſq. *Saliſbury*
Colliſon, Mr. John, *Carſhalton*
Colquhoun, Patrick, Eſq. *Hoxton-ſquare*
Combe, Harvey Chriſtian, Eſq. Alderman, M. P. *Great Ruſſel-ſtreet, Bloomſbury*
Combrune, Gideon, Eſq. *Berners-ſtreet*
Compton, Mr. Henry, *Charlotte-ſtreet, Pimlico*
††Conant, Nathaniel, Eſq. *Great Marlborough-ſtreet*
P Coningham, James, Eſq. *Pancras-lane, Queen-ſtreet*
Cook, Major William, *Little Ormond-ſtreet*
Cooke, Mr. John Kenworthy, *Red-lion-ſquare*
Coombe, Wm. Eſq.
Cooper, Mr. Benjamin, *Earl-ſtreet, Blackfriars*
Cooper, Allen, Eſq. *John-ſtreet, Bedford-row*
Cope, William, Eſq. *Sanctuary, Weſtminſter*
Copely, Thomas, Eſq. *Netherall, near Doncaſter, Yorkſhire*
P Coppens, B. M. D. *Ghent, Flanders*

Corbyn,

Corbyn, Mr. John, *Holborn*
Coſſer, Stephen, Eſq. *Abingdon-ſtreet*
Cottsford, Edward, Eſq.
Couſſmaker, Lannoy Richard, Eſq. *Gower-ſtreet, Bedford-ſquare*
Couſſmaker, William Kops, Eſq. *Hackney*
Cowell, George, Eſq. *America-ſquare*
Cox, Robert Albion, Eſq. *Little Britain*
Cox, Mr. William, *Beaufort buildings*
Coxwell, Mr. Henry, *Fleet-ſtreet*
Cradock, Joſeph, Eſq. M. A. and F. A. S. *Gumley, Leiceſterſhire*
Craig, Charles Alexander, Eſq. *Great Scotland-yard*
Crawford, John, Eſq. *Newman-ſtreet*
††Crawſhay, Richard, Eſq. *George Yard, Thames-ſtreet*
††Crawſhay, William, Eſq. *ditto*
Crawley, Samuel, Eſq. *Ragnal-hall, Nottinghamſhire*
Creak, Mr. William, *Cornhill*
Criſp, John, Eſq. F. R. S. *Abroad*
Criſwell, Mr. William, *Bedford-row*
Crocker, Benjamin, Eſq. *Ardwick-green, Mancheſter*
Crocker, Mr. Abraham, *Froome, Somerſetſhire*
Crook, Thomas, Eſq. *Tytherton, near Chippenham, Wilts*
Crook, John, Eſq. *Bryanſtone-ſtreet*
Croſs, William, Eſq. *Thorngrove-houſe, Worceſter*
Crowder, William Henry, Eſq. *Frederick's-place, Old Jewry*

††Crowther, Philip Wyatt, Eſq. *Guildhall*
Cunningham, William, Eſq.
Curtis, John, Eſq. *Mile-end*
Curwen, John Chriſtian, Eſq. M. P.

D.

**Devonſhire, William, Duke of
**Dartmouth, William, Earl of, F. R. S.
Dundas, Thomas Lord, F. R. and A. S.
Dundas, the Right Hon. Henry, M. P. *Somerſet-place*
P Dolben, Sir William, Bart. V. P. M. P. *Bridge-court, Channel-row, Weſtminſter*
Denham, Sir James Stewart, Bart. M. P.
Douglaſs, Admiral John, *Chicheſter*
Dalliſon, Mr. Thomas, *Wapping*
Dampier, Edward, Eſq. *Grove-place, Hackney*, and *Harpur-ſtreet*
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Daniell, James, Eſq. *Upper Wimpole-ſtreet*
Davenport, John, Eſq. *John ſtreet, Adelphi*
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Davis, Mr. Thomas
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Daviſon,

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Dawes, John, Eſq. *Pall-mall*
Dawſon, William, Eſq. *Mancheſter-ſquare*
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Dawſon, Mr. Robert, *St. Paul's Church-yard*
† Day, Thomas, Eſq. *Leiceſter-place, Leiceſter-fields*
Deane, John, Eſq. *Hythe, near Southampton*
Deane, Mr. Matthias, *Walton-place, Blackfriars-road*
Delafield, Joſeph, Eſq. *Caſtle-ſtreet, Long-acre*
Devalaud, George, Eſq. *Bloomſbury-place*
De l'Hoſte, Lieut. Colonel, *Weymouth-ſtreet, Portland Place*
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Dent, John, Eſq. M. P. F. A. S. *ditto*
P††Dent, William, Eſq. *Batterſea-riſe*
Denſanges, Mr. William, *Wheeler-ſtreet, Spitalfields*
Deſenfans, Noel, Eſq. *Charlotte-ſtreet, Portland-Place*
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Devaynes, John, Eſq. *Spring-gardens*
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Dickinſon, Henry, Eſq. *Leadenhall-ſtreet*
Dickinſon, Charles, Eſq. *No. 56, Warren-ſtreet*

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Digby, Kenelm, Eſq.
Ditcher, Philip, Eſq. *Eaſt Bergholt, Suffolk*
Dixon, Marcus, Eſq. *London-ſtreet, Fenchurch-ſtreet*
Doe, Thomas, Eſq. *Bygrave Park, Herts*
Dollond, Mr. Peter. *St. Paul's Church-yard*
Dollond, Mr. John, *ditto*
Dorrett, John, Eſq. *Bruton-ſtreet*
Douce, Thomas Auguſtus, Eſq. *Townmalling, Kent*
Doughty, John, Eſq. *Aldermanbury*
P Douglaſs, William, Eſq. *America-ſquare*
Dowbiggin, Mr. Lancelot
Dowbiggin, Samuel, Eſq. *Hatfield-Regis, Herts*
Down, Richard, Eſq. *Bartholomew-lane*
Downer, Mr. Henry, *Fleet-ſtreet*
Drake, George, Eſq. *Bedford-ſquare*
Drake, Francis, Eſq. *Wimpole-ſtreet*
Drake, Mr. Samuel, *Margaret-ſtreet, Weſtminſter*
P Draper, Daniel, Eſq. *St. James's ſtreet*
Draper, Mr. John, *Clayton-place, Kennington-road*
Driver, Mr. William, *Kent-ſtreet-road*
Duberley, James, Eſq. *Soho-ſquare*
Du Bois, John Frederick, Eſq. *James-ſtreet, Adelphi*
Du Bois, Edward, Eſq. *ditto*
Dundas, Robert, Eſq. M. P. *Somerſet-place*
Dundaſs, David, Eſq. *Richmond, Surry*
Dunn, Samuel, Eſq. *Adelphi*
P Duroure, Colonel John, F. R. and A. S.
††*Duval, the Rev. Philip, D. D. F. R. and A. S. *Newman-ſtreet*

E.

††P Egremont, George Wyndham, Earl of
Eardley, Sampſon Lord, M. P. F. R. and A. S.
Einſiedel, his Excellency Count
Elphinſtone, the Honourable William
Eden, Sir John, Bart. M. P.
Eden, Sir Frederick Morton, Bart. F. A. S.
Erſkine, Sir William, Bart. M. P.
Earle, Henry, Eſq. *Gower-ſtreet*
Eaton, Rev. Stephen, A. M. and F. A. S. *St. Ann's, Soho*
P Eaton, Peter, Eſq. *Weſtford, Eſſex*
Echardt, Francis Frederick, Eſq. *Whiteland Houſe, Chelſea*
P Eckerſall, John, Eſq. *Burford Houſe, near Dorking, Surry*
Eccles, the Rev. Allan Harriſon, *Bow, Middleſex*
P Eccleſton, Thomas, Eſq. *Scareſbrick, Lancaſhire*
Edwards, John, Eſq. *Warnford-court*
Edwards, Bryan, Eſq. M. P. F. R. and A. S. *Great George-ſtreet*
Edwards, Samuel, Eſq. *Stamford, Lincolnſhire*
Edwards, Mr. John, *at Mr. Wood's, No. 35, Broad-ſtreet-buildings*
Ellill, John, Eſq. *Queen-ſtreet, Cheapſide*
Elliot, John, Eſq. *Pimlico*
P Errington, John, Eſq. *Stanhope-ſtreet, May-fair*
Eſdaile, Joſh, Eſq. *Albyns, Eſſex*

*††Ewer, Samuel, Eſq. F. L. S. *Hackney*
P Ewbank, Andrew, Eſq. *Upper Groſvenor-ſtreet*

F.

††Fife, James, Earl of, F. R. and A. S.
††Falmouth, George Evelyn Lord Viſcount
Finch, Honourable Captain William, *Albury, near Guildford*
Fludyer, Sir Samuel, Bart. *Baker-ſtreet, Mancheſter-ſquare*
P Fletcher, Sir Henry, Bart. M. P. *Southampton-row, Bloomſbury*
††Ford, Sir Francis, Bart. *Queen-Ann-ſtreet Weſt*
Farquhar, Sir Walter, Bart. *Conduit-ſtreet*
Fairman, William, Eſq. *Lynſted, Kent*
Farmer, Samuel, Eſq. *Beckenham, Kent*
Farell, Rev. Charles, *Bungton, near Kimbolton, Huntingdonſhire*
Fearon, Henry, Eſq. *John-ſtreet, Adelphi*
P Felton, Samuel, Eſq. F. R. and A. S. *Carburton-ſtreet, Fitzroy-ſquare*
P Fermor, William, Eſq.
††Ferris, Samuel, M. D. F. R. and A. S. *Harpur-ſtreet*
Feuilleteau, William, Eſq. F. R. and A. S. *Charlotte-ſtreet, Rathbone-place*
Filmer, Beverſham, Eſq. *King's-road*
Fitzherbert, Thomas, Eſq. *Roehampton, Surry*
Fleetwood, Robert, Eſq. *Ely-place*

Fletcher,

Fletcher, James, M. D.

• Fletcher, Mr. Thomas, *Bridge-ſtreet, Blackfriars*

Fludyer, George, Eſq. M. P.

Forde, the Rev. Brownlow, D. D. *Newgate-ſtreet*

Fordyce, George, M. D. F. R. S. *Eſſex-ſtreet, Strand*

Forſyth, William, Eſq. F. A. S. *Kenſington*

Foulſton, Mr. John, *No.* 18, *Frith-ſtreet, Soho*

Fowle, Dr. William, *Cecil-ſtreet, Strand*

††Fowler, David Burton, Eſq. *Fig-tree-court, Temple*

P Franco, Jacob, Eſq. *Gerrard's-Croſs*

Frankland, William, Eſq. *Cavendiſh-ſquare*

Franklin, Captain William, *Beaufort-buildings, Strand*

Fraſer, James, Eſq. *Golden-ſquare*

Fraſer, Simon, Eſq. *King's-arms-yard, Coleman-ſtreet*

Fraſer, William, Eſq. F. R. S. *Queen-ſquare, Holborn*

Fraſer, Mr. David, *Great Pultney-ſtreet*

French, Mr. George, *Eaſt Cheap*

Frend, Mr. George, *Abroad*

Fry, Edmund, Eſq. *Type-ſtreet, Chiſwell-ſtreet*

Fry, Mr. Joſeph Storrs, *Briſtol*

Fry, Mr. Henry, *Middle Moorfields*

Fullarton, Colonel William, M. P. and F. R. S. *Parliament ſtreet*

Fulton, Henry, Eſq. *Watling-ſtreet*

G.

Gordon, Alexander Duke of, K. T. and F. R. S.
• Groſvenor, Richard Earl of, F. R. S.
Glencairn, Earl of
Glaſgow, George Earl of, F. R. and A. S.
P Gallaway, Arundell Lord Viſcount, M. P. and K. B.
P Greville, Right Hon. Charles, M. P. and F. R. S.
Greville, the Honourable Robert, F. R. and A. S.
Grey, Sir Henry, Bart. *Howick, Nothumberland*
††Gaſcoigne, Sir Thomas, Bart. F. A. S. *Partington, in the County of York*
Green, Major-General Sir William, Bart. F. R. and A. S. *Chandos-ſtreet, Cavendiſh-ſquare*
P Geary, Sir William, Bart. M. P. *Oxen Heath, Kent*
Galloway, James, Eſq. *Gower-ſtreet*
Gape, Joſeph, Eſq. *Bridge-ſtreet, Weſtminſter*
Garnett, David, Eſq. *Baſinghall-ſtreet*
Garnet, Robert, Eſq. *Fenchurch-ſtreet.*
Garrett, Daniel, Eſq. *Portſmouth*
Garthſhore, Maxwell, M. D. F. R. and A. S. *St. Martin's lane*
Garthſhore, William, Eſq. M. P. *Manchester-ſquare*
Gee, John, Eſq. *Wardour-ſtreet, Soho*
Gibbes, George Smith, M. A. *Magdalen College, Oxford*
Gilbert, Mr. Henry, *Holborn*
Gillet, Gabriel, Eſq. *Guildford-ſtreet*

Giſborne,

Giſborne, Thomas, M. D. *Clifford-ſtreet*
Giſt, Samuel, Eſq. *Gower-ſtreet*
Glanville, Mr. Edward, *Broad Sanctuary, Weſtminſter*
P Godſchall, William Man, Eſq. F. R. and A. S.
Godwin, James, Eſq. *Wingfield, Berks*
Golden, Robert, Eſq. *Red-lion-ſtreet*
Goldthwaite, Thomas, jun. Eſq.
Goodwyn, Henry, jun. Eſq. *Eaſt Smithfield*
Goodchild, Mr. Thomas, *Tooley-ſtreet*
Goodhew, William, Eſq. *Deptford*
Gotobed, John, Eſq. *Norfolk-ſtreet, Strand*
Gordon, Edward, Eſq. *Bromley, Middleſex*
Goſling, William, Eſq. F. A. S. *Fleet-ſtreet*
Goſling, Francis, Eſq. *Fleet-ſtreet*
Graham, George, Eſq.
Graham, Aaron, Eſq. F. R. S. *Great Ruſſel-ſtreet*
Grant, General James, *Sackville-ſtreet*
Græme, General David, *Lower Seymour-ſtreet*
Grant, Major John, *Hill-ſtreet, Berkeley-ſquare*
††Grant, John, Eſq. *Fleet-ſtreet*
Grant, Peter, Eſq. *Fort Auguſtus, North Britain*
P††Gray, Walker, Eſq. *London-ſtreet*
Gray, John, Eſq. *Somerſet-place*
P Green, Rupert, Eſq. *Percy-ſtreet, Rathbone-place*
Green, Mr. Joſeph, *Tower-ſtreet*
Green, Mr. William, *Deptford*
††Greene, Thomas, Eſq. F. A. S. *Gray's-inn*
Greene, Joſeph, Eſq. *New Boſinghall-ſtreet*
Greenwood, Abraham, Eſq. *Staining-lane*
P Gregory, Robert, Eſq. *Berners-ſtreet*
Grenfell, William, Eſq. *Copper Office, Thames-ſtreet*

Gower,

Gower, Charles, Eſq. *Edmonton*
Greſley, Rev. William
Grieve, John, M. D. F. R. and A. S. *Norfolk-ſtreet, Strand*
Griffin, Mr. John, *Steward-ſtreet, Spitalfields*
P††Griffith, Edward, Eſq. of *Caernarvon*
Griffith, John, Eſq. *Queen-ſquare, Bloomſbury*
Groote, George William, Eſq. *Dean-Street, Soho*
Groſvenor, Richard Erle Drax, Eſq. M. P. *Berkeley-ſtreet, Manchester-ſquare*
P Grote, George, Eſq. *Threadneedle-ſtreet*
Groves, John, Eſq. *Sloane-ſtreet, Knightſbridge*
††Grubb, John, Eſq. *Lincoln's-inn-fields*
Gubbins, Mr. James, *Surry-ſtreet*
Gwillim, Henry, Eſq. *Beſwell-court, Carey-ſtreet*

H.

††*Hardwicke, Philip Earl of, F. R. and A. S.
Hawke, Martin, Lord
Heathfield, Francis Auguſtus Lord
Haſlang, His Excellency Count
Harcourt, Honourable General William
Honeywood, Sir John, Bart. M. P. *Bedford-ſquare*
Hume, Sir Abraham, Bart. F. R. S. *Wormleybury*
Hanmer, Sir Thomas, Bart. *Hanmer, Flintſhire*
Heathcote, Sir John, *Edenſor, Langton Hall, Staffordſhire*
Harley, Rt. Honourable Thomas, Alderman, M. P. *Alderſgate-ſtreet*

Hope,

Hope, the Rt. Honourable Brigadier-General John
Hope, the Honourable Lieutenant-Colonel Charles
Herne, Sir William, Alderman
Hay, Major-General Alexander
Haring, John, Eſq. *George-ſtreet, Hanover-ſquare*
Hadley, Mr. Nathaniel, *Long-acre*
Hall, Mr. Abraham, *Aldermanbury*
Hall, Mr. Luke, *Gutter-lane, Cheapſide*
Hall, Phinehas, Eſq. *Hans-place, Sloane-ſtreet*
Hall, James, Eſq. *King-ſtreet, Holborn*
Hallet, William, Eſq. *Farringdon, Berks*
Hamilton, Rev. Anthony, D. D. F. R. and A. S. *Saville-row*
Hamilton, William, Eſq. *Blackheath*
Hamilton, William, M. D. *Old Broad-ſtreet*
Hammett, John, Eſq. *Lombard-ſtreet*
††Hammond, William Parker, Eſq.
Handaſyde, Mr. Gilbert, *Green-walk, Southwark*
Hankey, Joſeph, Eſq. *Poplar*
Hanmer, Job, Eſq. *Holbrook-Hall, Sudbury*
Hanſon, John, Eſq. *Bruton-ſtreet*
Hardcaſtle, Joſeph, Eſq. *Duck's-foot-lane*
Harding, John, Eſq. *College-ſtreet, Weſtminſter*
P††Harman, Jeremiah, Eſq. *Princes-ſtreet, Lothbury*
Harper, Robert John, Eſq. *Britiſh Muſeum*
Harris, Robert, Eſq. Banker, *Reading*
Harriſon, Richardſon, Eſq. *Freern-Barnet, Middleſex*
Harriſon, Thomas, Eſq. *Wolverton, Bucks*

Harrop, Joſeph, Eſq. *Great Marlborough-ſtreet*
Hart, Mr. Henry, *Lamb's-Conduit-ſtreet*
Harvey, Robert, M. D. *Adelphi*
Harwood, William, Eſq. *Hanwell-park*
Haſſal, Charles, Eſq. *Eaſtwood, Pembrokeſhire*
* Haſtings, Warren, Eſq. *Park-lane*
Hawkins, John, Eſq. F. R. S.
Hay, Robert, Eſq. *Portland Place*
Hay, James, Eſq. *Great Portland-ſtreet*
Hay, Colonel Patrick, *Upper Norton-ſtreet*
Hayward, Mr. Richard, *Piccadilly*
††Heaviſide, Richard, Eſq. *Somerſet-ſtreet, Portman-ſquare*
† Heaviſide, John, Eſq. *George-ſtreet, Hanover-ſquare*
P††Hebert, James, Eſq. *Great Portland-ſtreet*
Hele, John, Eſq. *Charlotte-ſtreet, Rathbone-place*
††Henderſon, John, Eſq. LL. B. and F. A. S. *Terrace, Adelphi*
Hennell, David, Eſq. *Foſter-lane*
Hepworth, John, Eſq. *York*
Heron, Patrick, Eſq. M. P. *Cavendiſh-ſquare*
Hewlet, Mr. William, *Strand*
Hewetſon, John, Eſq. *Tower-hill*
Hewitt, Mr. Henry Thomas, *Keene's-row, Walworth*
Hicks, Mr. John, *Brighton*
Higgins, Matthew, Eſq. *Conduit-ſtreet*
Hilton, John, Eſq. *Ironmonger-lane, Cheapſide*
Hill, Richard, Eſq. *Plymouth, Glamorganſhire*
Hill, Edward, Eſq. *Albion-ſtreet, Blackfriars-road*

P Hoare,

P Hoare, Charles, Eſq. F. A. S. *Chapel-ſtreet, Groſvenor Place*

Hoare, Jonathan, Eſq. *Stoke Newington*

Hobbs, Mr. Joſeph, *Margaret-ſtreet, Cavendiſh-ſquare*

P Hobſon, William, Eſq.

Hobſon, George, Eſq.

Hodgſon, Mr. George, *Lambeth-marſh*

Hood, Alexander, Eſq. *Royal Navy*

Hodgkinſon, Mr. Sampſon, *Snow-hill*

P Holder, James, Eſq. *Aſh-park*

P Holland, Henry, Eſq. F. A. S. *Sloane-place, Knightſbridge*

Holland, Mr. Richard, *Half-moon-ſtreet, Piccadilly*

Holland, Mr. George, *High Holborn*

Holliday, John, Eſq. F. R. S. *Great Ormond-ſtreet*

Hollis, Thomas Brand, Eſq. F. R. and A. S. *Cheſterfield-ſtreet*

Holcombe, Rev. William, *Canon of St. David's*

Holmes, Mr. John, *Whitefriars*

Holme, Mr. William, *Baſs-court, Thames-ſtreet*

Home Patrick, Eſq. M. P. *Gower-ſtreet*

Homfray, Samuel, Eſq. *Mirthir Tidville, Glamorganſhire*

Honeybourne, Mr. Robert, *Stourbridge*

Honeywood, Filmer, Eſq. M. P. *Charles-ſtreet, Berkeley-ſquare*

Honyman, Captain Robert, M. P. *Royal Navy*

Hooper, Thomas, Eſq. *Panty Geitre, Monmouthſhire*

Horner, Thomas, Eſq. *Mell's Park, near Froome, Somerſetſhire*
Hornocks, John, Eſq. *Preſton, Lancaſhire, or No. 5, Bucklerſbury*
Horton, Mr. William, *Newgate-ſtreet*
Hotham, John, Eſq. *Middle Temple-lane*
P Houghton, William, Eſq. *Conduit-ſtreet*
P Howard, Edward, Eſq. F. R. S. *Doughty-ſtreet*
Howard, Barnard, Eſq. *Farnham, Suffolk*
Howell, Richard, Eſq. *Thames-ſtreet*
Howell, Mr. John, *Vine-ſtreet, Piccadilly*
Howarth, Richard, Eſq. F. S. A. *Chancery-lane*
P Hudſon, Vanſittart, Eſq. *Temple*
Hughes, Rev. Edward, *Kinmell Park, St. Aſaph*
Hulme, William, Eſq. *Twydale, Kent*
Hunt, Rowland, Eſq.
Hunter, John, Eſq. M. P. *Bedford-ſquare*
Hurt, Charles, Eſq. *Wirkſworth, Derbyſhire*
Huffey, William, Eſq. M. P. *Saliſbury*
Hyde, John, Eſq.

I.

P Ilcheſter, Henry Thomas Earl of
Johnſtone, the Honourable Lieutenant-Colonel Cochrane, M. P.
††Ingilby, Sir John, Bart. M. P. F. R. and A. S.
Johnſton, Sir William, Bt. *Queen-ſtreet, May-fair*
P Jackſon, William, Eſq. *Dowgate-wharf*
††Jacob, Joſeph, Eſq. *Greek-ſtreet, Soho*

Jardin,

Jardin, Mr. John, *Throgmorton-ſtreet*
P Idle, Chriſtopher, Eſq. *Strand*
Jeffery, George, Eſq. *Throgmorton-ſtreet*
Jefferys, Thomas, Eſq. *Cockſpur-ſtreet*
Jefferys, Mr. George, *Brick-lane, Old-ſtreet*
Jefferys, Mr. George
P Jenkins, Thomas, Eſq. *Rome*
P Jenour, Joſhua, Eſq. *Fleet-ſtreet*
Jervoiſe, Jervoiſe Clark, Eſq. M. P. *Hanover-ſquare*
Jeudwine, Thomas, Eſq. *Baſinghall-ſtreet*
Ince, William, Eſq. *Broad-ſtreet, Carnaby-market*
Inglis Hugh, Eſq. *Bedford-row*
Innes, Hugh, Eſq. *Taviſtock-ſtreet, Bedford-ſquare*
Johnſon, Alexander, LL. and M. D. *Portland-ſtreet*
††Johnſon, John, Eſq. *Mary-le-bone-ſtreet*
Johnſon, John, jun. Eſq. *Berner's-ſtreet*
Johnſon, Mr. James, *Bryanſtone-ſtreet*
Johnſon, James, Eſq. *Lambeth Walk*
Johnſton, Alexander, Eſq. *Drury-lane*
Jones, Edward, Eſq. *Weprehall, Flintſhire*
Jones, John, Eſq.
Jones, John, Eſq. *Frankley, Wiltſhire*
Jones, Mr. Francis, *Groſvenor-ſtreet*
Jones, Mr. John, *Charlotte-ſtreet, Manſion-houſe*
Jones, Griffith, Eſq. *Auſtin-friars*
Jones, Henry, Eſq. *Old City Chambers*
Jourdan, Major Edward, *Harley-ſtreet*
Ives, Jeremiah, Eſq. *St. Clement's, Norwich*
Ives, Jeremiah, Eſq. *Cotton, near Norwich*

K.

* Kinnoull, Robert Drummond Hay Earl of
Kinnaird, George Lord, F. R. and A. S.
Keith, George Lord, *Cavendiſh-ſquare*, M. P.
Kaye, Rev. Sir Richard, Bart. Dean of Lincoln, LL. D. F. R. and A. S.
Kaye, Mr. Joſeph, Architect, *Saville-row*
Kappen, Mr. William, *Southampton-ſtreet, Strand*
Karr, Andrew Ramſay, Eſq. *Wimpole-ſtreet*
Keighley, James, Eſq. *Hertford-ſtreet, May-fair*
††Kendrick, Edward, Eſq. *King-ſtreet, Covent-garden*
Kent, Nathaniel, Eſq. *Windſor*
††Keyſall, John, Eſq. *Queen's-ſquare, Holborn*
Kidman, Mr. John, *Fleet-ſtreet*
King, the Rev. Richard, *Worthin, Shropſhire*
King, Mr. Thomas, jun. *Great Queen-ſtreet*
Kingſton, John, Eſq. *Stratford-place*
Kirkby, William, Eſq. *Exchequer-Office, Temple*
Knill, John, Eſq. *Gray's-inn*
Knight, Mr. George, *Cliffe, near Rocheſter*
Knubley, Richard, Eſq. *Bath*

L.

Loughborough, Alexander Lord, F. R. and A. S. Lord High Chancellor of Great-Britain
P Lanſdowne, the Moſt Noble the Marquis of
* Leiceſter,

* Leiceſter, George Earl of, F. R. S. and Preſident of the Society of Antiquaries
**Liverpool, Charles Earl of, V. P.
P Lewiſham, George Lord Viſcount, F. R. and A. S. and F. L. S.
Leiceſter, Sir John, Bart. M. P. *Piccadilly*
P Laurent, Sir Francis, Kt.
P Lewes, Sir Watkin, Kt. V. P. *Parliament-ſtreet*
P††Lambert, Charles, Eſq. F. A. S. *Temple*
Lambert, Aylmer Bourke, Eſq. F. R. and A. S. and F. L. S. *Lower Groſvenor-ſtreet*
Lambert, Anthony, Eſq.
Landman, Iſaac, Eſq. *Royal Academy, Woolwich*
Langton, Mr. Daniel, Builder, *Wandſworth*
P Larkins, William, Eſq. F. R. and A. S. *Blackheath-point*
Law, Thomas, Eſq. *Abroad*
Lawrence, Richard, Eſq. *Mincing-lane*
Lawrence, Richard James, Eſq.
Leach, Mr. Edward, *Cotton Manufactory, Tottenham-court-road*
Leſevre, Charles Shaw, Eſq. M. P. *Bedford-ſquare*
Leader, William, Eſq. *Wandſworth*
††Leake William, Eſq. *Parliament-ſtreet*
Leatham, William, Eſq. *Chatham-ſquare, Blackfriars*
Leatham, Iſaac, Eſq. *Burton-le-ſtreet, Yorkſhire*
Lee, William, Eſq. *Alton, Herts*
Legh, George John, Eſq. *Pall-Mall*
††Leigh, John, Eſq. *Bedford-ſquare*

Lettſom, John Coakley, M. D. F. R. and A. S. *Baſinghall-ſtreet*

Levy, Moſes Iſaac, Eſq. F. A. S. *George-ſtreet, Hanover-ſquare*

††Lewis, Percival, Eſq. *Lincoln's-inn*

††Lewis, William, Eſq. F. L. S. *Holborn*

Lewis, Thomas, Eſq. *Great James-ſtreet, Bedford-row*

Lillingſtone, A. Spoone, Eſq.

Liptrap, John, Eſq. F. A. and L. S. *Whitechapel-road*

Llewellyn, John, Eſq. *Penllengane, Glamorgan-ſhire*

P Lloyd, William, Eſq.

* Lock, William, Eſq. *Golden-ſquare*

P Long, Samuel, Eſq. M. P. *Hill-ſtreet, Berkeley-ſquare*

Longman, Mr. Thomas, *Cheapſide*

P Loveden, Edward Loveden, Eſq. M. P.

Lowndes, William, Eſq. *Scotland-yard, Whitehall*

Lowten, Thomas, Eſq. *Temple*

Lowth, Rev. Robert, *George-ſtreet, Hanover-ſquare*

Loxdale, Thomas, Eſq. *Braidley-Lodge, near Bil-ſon, Staffordſhire*

††Lumley, Mr. William, *Weſton-place, Pancras, or Chancery-lane*

† Lynd, James, Eſq. *Beaufort-buildings*

M.

* Macclesfield, George Earl of

* Morton, George Earl of, F. R. and A. S.

P Malmeſbury,

P Malmeſbury, James Lord, K. B. and LL. D.
Milford, Richard Lord, M. P.
Marſham, the Honourable Charles, M. P.
*PMonckton, the Honourable Edward, M. P. *Portland place*
Middleton, Sir Charles, Bart. M. P. *Hertford-ſtreet, May-fair*
Moleſworth, Sir William, Bart. *Peucarrow, Cornwall*
* Mac Pherſon, Sir John, Bart. M. P.
Morſhead, Sir John, Bart. M. P. *Hampton-court*
Monro, Sir Hugh, Bart. *Glouceſter-place, Portman-ſquare*
P Mackreth, Sir Robert, M. P. *Cork-ſtreet*
Macleod, Major-General Norman, M.P. F. R. S. *St. Alban's ſtreet*
Macdonald, John, M. D. *King-ſtreet, Soho*
M'Leod, John, Eſq. *Argyll-ſtreet*
††Mac George, William, Eſq. *New Bond-ſtreet*
Macmurdo, Mr. Edward Longdon, *Bread-ſtreet*
P Macnamara, John, Eſq.
Mac Dougal, Mr. James, *No.* 418, *Oxford-ſtreet*
Mac Konochie, A. Lochart, Eſq. *Suffolk-ſtreet, Charing-croſs*
Magens, Dorrien, Eſq. *Cavendiſh-ſquare*
* Maitland, Ebenezer, Eſq. *Coleman-ſtreet*
Malcolm, Mr. Jacob, *Stockwell*
Malo, Mr. Joſeph, *Pavement, Moorfields*
Malton, James, Eſq. *Norton-ſtreet, Portland-place*
Manley, John George, Eſq. *Braziers, Oxon*
Mainwaring, Mr. Thomas, *Strand*

Marks,

Marks, Mr. John, Builder, *Princes-ſtreet, Hanover-ſquare*
Marriott, John Martin, Eſq. *Lamb's-Conduit-ſtreet*
Marſh, Mr. William, *South-ſtreet, Groſvenor-ſquare*
Marſhall, Andrew, M. D. *Thavies-inn*
Martin, James, Eſq. M. P. *Downing-ſtreet*
Martin, Matthew, Eſq. *Parliament-ſtreet*
Martyn, the Reverend Thomas, B. D. F. R. S. F. L. S. *Profeſſor of Botany, Cambridge, Frith-ſtreet, Soho*
Martin, Thomas, Eſq. *Great Marlborough-ſtreet*
††Maſkall, Samuel, Eſq. *Mitre-court, Milk-ſtreet*
Matthews, Edward, Eſq. *Sol's-row, Tottenham-court-road*
Mayor, Mr. Joſeph, *Little Moorfields*
Mayhew, John, Eſq. *Broad-ſtreet, Carnaby-market*
Meares, John, Eſq. *Park-lane*
Meheux, John, Eſq.
* Melville, General Robert, F. R. and A. S. *Brewer-ſtreet*
††Meredith, William, Eſq. *Harley-place*
Meredith, George, Eſq. *ditto*
Merry, William, Eſq. *Gower-ſtreet*
Metcalfe, Chriſtopher Barton, Eſq. *Weſt-Ham*
Meux, Richard, jun. Eſq. *Liquor-pond-ſtreet*
††Meyrick, John, Eſq. F. A. S. *Great George-ſtreet*
Meyrick, Owen Patland, Eſq. *Bodalgan, Angleſey*
††Michell, Mathew, Eſq. *Beaufort-buildings, Strand*
Middleton, John, Eſq. *Lambeth*
Midford, George, M. D. *Weſt-ſquare, Lambeth*
††Mildred,

††Mildred, Daniel, Eſq. *White-hart-court, Grace-church-ſtreet*
Miles, Mr. John, *Birmingham*
Millikin, Mr. Hallay Benſon, *Whitechapel*
Millington, Langford, Eſq. *Tooting, and Berners-ſtreet*
Millington, Mr. Thomas, *Golden-ſquare*
P Mills, Abraham, Eſq. *Fence-houſe, Macclesfield*
Mills, Mr. George, *Old Swan-ſtairs*
Mills, Samuel, Eſq. *Finſbury-place*
Miller, John, Eſq. *Red-lion-ſquare*
Milnes, Richard Slater, Eſq. M. P. *Eaſton, near Ferrybridge, Yorkſhire*
Minier, Mr. William, *Strand*
Minier, Mr. Charles, *ditto*
Miniſh, Mr. William, *Whitechapel*
Miſt, Mr. Henry, *Long-acre*
Mitchel, Michael, Eſq. *Walthamſtow*
Mitchel, William, Eſq. M. P. *Devonſhire-place*
Mitford, Robert, Eſq. *Great Portland-ſtreet*
Montreſor, John, Eſq. *Harley-ſtreet*
Montolieu, Lewis, Eſq. F. A. S.
* Montagu, Mrs. Elizabeth, *Portman-ſquare*
Morley, William, Eſq. *New Broad-ſtreet*
Morſe, Leonard, Eſq. F. R. S. and S. A. *Great George-ſtreet, Weſtminſter*
Morris, Mr. William, *Whitcombe-ſtreet*
Mortimer, Charles, Eſq. *Conduit-ſtreet*
Morton, Thomas, Eſq. *John-ſtreet, Adelphi*
Moſely, Walter Michael, Eſq. *near Worceſter*

Moſer,

Moſer, Mr. John, *Frith-ſtreet, Soho*
Munn, Daniel Rolfe, Eſq. *Hammerſmith*
Murrey, John, M. D. *Bedford-ſtreet, Bedford-ſquare*

N.

P Norfolk, Charles Duke of, Preſident, F. R. and A. S.
**Northumberland, Hugh Duke of, V. P. K. G. F. R. and A. S.
††Northampton, Charles Earl of
Northeſk, William Earl of
Naghton, Thomas, M. D.
Naſh, Mr. Thomas, *Worceſter*
Naſh, John, Eſq. *Dover-ſtreet*
Neale, Mr. Thomas, jun. *Beaumont-ſtreet, Cavendiſh-ſquare*
Newbury, Benjamin, Eſq. *Ely-place*
Newbury, Jacob, Eſq. *New Inn*
Newcombe, Mr. William, *Bank*
Newnham, the Rev. William Moore, *Boyle-ſtreet, Saville-row*
P Newton, Robert, Eſq. *Norton-houſe, Berks*
P Newton, Andrew, Eſq. *Cecil-ſtreet, Strand*
Newton, Mr. John, *Lamb's-Conduit-ſtreet*
De Neyva, Joſeph da Cunha Para, Eſq. *Artillery-place*
Nichols, John, Eſq. *Red-Lion-paſſage, Fleet-ſtreet*
Nicolay, Frederick, jun. Eſq. *St. James's Palace*
† Nicol, George, Eſq. *Pall-mall*

Noble,

Noble, William, Eſq. *Pall-mall*
Nouaille, Peter, Eſq. *Greatneſs, Kent*
Noireterre, Mademoiſelle de, *Paris*
Norman, Robert, Eſq. *Cannon-ſtreet*
Northey, William, Eſq. *Queen-ſtreet, May-fair*
Nutting, Mr. Joſeph, *King-ſtreet, Covent-garden*

O.

P Oſſory, John Earl of Upper, F. R. and A. S.
Ogilvie, Scroope, Eſq. *Pall-mall*
Ogle, Mr. Thomas, *Abroad*
Oldham, John, Eſq. *Sackville-ſtreet*
Oliver, the Rev. John, *Croombs-hill, Blackheath*
Ord, John, Eſq. F. R. and A. S. *Lincoln's-inn-fields*
Orrell, Thomas, Eſq. *Winſley-ſtreet, Oxford-ſtreet*

P.

**Portland, William Henry Duke of, V.P. K. G. F. R. and A. S.
P Plymouth, Otho Earl of, F. R. and A. S.
P Petre, Lord
**Pitt, the Right Honourable William, M. P.
Pelham, the Right Honourable Thomas, M. P. *Stratton-ſtreet*
* Puſey, Honourable Philip, *Upper Brook-ſtreet*
Pulteney, Sir William, Bart. M. P. *Bath-houſe*
Packer, Mr. William, *King-ſtreet, Soho*
Page, Francis, Eſq. M. P. *Aſhton, Oxfordſhire*

Page,

Page, Francis, Eſq. *Newbury, Berks*
Page, Frederick, Eſq. *Serjeant's-inn, Fleet-ſtreet*
Page, Mr. John, *High Holborn*
P Paice, Mr. Joſeph, *Bread-ſtreet-hill*
Pakenham, Captain Edward, R. N.
Papworth, Mr. Thomas, *Great Portland-ſtreet*
Park, Mr. James, *Baldwin's gardens*
† Parkes, Richard, Eſq. *Broad-ſtreet, Bloomſbury*
Parkins, Mr. William, *Adelphi Wharf*
Parker, David, Eſq. *King's Mews*
Parker, Mr. William, *Fleet-ſtreet*
††Parker, Mr. Samuel, *Bridge-ſtreet, Blackfriars*
Parker, Mr. Thomas, *Fleet-ſtreet*
Parker, Samuel Walker, Eſq. *White Lead Works, Newcaſtle-upon-Tyne*
Parkinſon, Mr. Thomas, *Bloomſbury-market*
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Parry, Mr. Edward, *Newgate-ſtreet*
Parry, William, Eſq. *Norton-hall, Wiltſhire*
Parſon, Pearce, Eſq. *Doctors-commons*
Paterſon, William, Eſq. *Devonſhire-place*
Paxton, William, Eſq. *Queen-ſquare, Holborn*
Paxton, Mr. Chriſtopher, *Alderſgate-ſtreet*
††Payne, Samuel, Eſq. *Vauxhall*
Peacock, Mr. Lewis, *Lincoln's-inn-fields*
Pearce, William, Eſq. *Craig's-court*
††Pearſon, James, Eſq. *Baſinghall-ſtreet*
Peel, Robert, Eſq. M. P. *Bury, Lancaſhire*
Peirſon, Peter, Eſq. F. R. and A. S. *Inner Temple*

Pelerin,

Pelerin, Henry Ferdinand, Eſq. *No.* 7, *Lower James-ſtreet, Golden-ſquare*

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Penton, Mr. George, *New-ſtreet-ſquare, Shoe-lane*

P Perin, William Philip, Eſq. F. R. and A. S. *Bloomſbury-ſquare*

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Perry, James, Eſq. *Strand*

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Phillips, Mr. Richard, *St. Paul's Church-yard*

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Pickering, Mr. Robert

Pigou, William, Eſq. *Portland-place*

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Pontopidian,

Pontopidan, Charles, Eſq. *Copenhagen*
Pope, William, Eſq. *Hillingdon, Middleſex*
P Portman, Edward Berkeley, Eſq. *Bryanſton, near Blandford, Dorſet*
Porter, William, Eſq. *Copthall-court, Throgmorton-ſtreet*
Pote, Edward Ephraim, Eſq. *Eaſt-Indies*
P Potter, Chriſtopher, Eſq. *Abroad*
Potter, George, Eſq. *Charing-croſs*
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Powell, John Clark, Eſq. *ditto*
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Powlett, William Powlett, Eſq. M. P. *Sambourne, near Stockbridge*
Powney, Henry, Eſq. *Lamb's-Conduit-ſtreet*
P Prado, Samuel, Eſq.
Praed, William, Eſq. M. P. *Tyringham, Bucks*
Pratt, John, Eſq. *Lower Brook-ſtreet*
Preſton, Mr. Thomas, *Strand*
Pricket, Thomas, Eſq. *Wanſtead, Eſſex*
Pringle, Mark, Eſq. M. P. *Conduit-ſtreet*
Prinſep, John, Eſq. *Pall-Mall*
Pryce, Benjamin, Eſq. *Bath*
Pugh, David Heron, Eſq. *King-ſtreet, Cheapſide*

Q.

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R.

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**Radnor, Jacob Earl of, V. P. F. R. and A. S.
**Romney, Charles Lord, V. P. and F. R. S.
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Rawlinſon, Thomas, Eſq. *ditto*
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Read, Colonel Henry, *Lower Seymour-ſtreet*
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Reeves, John, Eſq. F. R. and A. S. *Cecil-ſtreet, Strand*

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††Reid, Andrew, Eſq. *Whetſtone, Middleſex*

† Reid, John, Eſq. *Bedford-ſquare*

††Remington, John, Eſq. *Milk-ſtreet, Cheapſide*

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Riddell, Colonel John, *Weymouth-ſtreet*

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Ritſon, Thomas, Eſq. *Ingram-court, Fenchurch-ſtreet*

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P Robinſon, Thomas, Eſq. *Vere-ſtreet, Cavendiſh-ſquare*

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Roope, John, Eſq. *Yarmouth*
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Roſe, George Henry, Eſq. *ditto*
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Ruſſel, John, Eſq. R. A. *Newman-ſtreet*
Ruſſel, William, Eſq. *Berwick, Northumberland*

S.

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P Suffolk, John Earl of
P Shafteſbury, Anthony Earl of, F. R. and A. S.
Scarborough, George Auguſtus Earl of
P Stanhope, Charles Earl of, F. R. S.
St. Vincent, John Earl
P Scarſdale, Nathaniel Lord
Stuart, the Honourable Charles, M. P.

P St. Aubyn, Sir John, Bart. F. R: and A. S. *Stratford-place*

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††Sinclair, Sir John, Bart. M. P. F. R. and A. S. *Whitehall*

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††Smith, Sir Sidney, Kt. Capt. R. N. Commander Grand Croſs of the Order of the Sword

††Smith, Major-General Edward

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† Salte, William, Eſq. *Poultry*

Sanders, John, Eſq. *Mortlake, Surry*

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Satterthwaite, Mr. John, *Mincing-lane*

Savage, Thomas, M. D. *Conduit-ſtreet*

Savage, Mr. James, *Great Queen-ſtreet*

Saunders, Thomas, Eſq. *Haydon-ſquare, Minories*

Saunders, Mr. George, F. A. S. *Oxford-ſtreet*

P Saunders, Mr. Edward Grey, *Edgware-road*

Saxon, Mr. Samuel, *Parliament-ſtreet*

Sayer, Thomas, Eſq. *Bow, Middleſex*

Sayer, Henry J. Eſq. *Lincoln's-inn*

Schaw, Lieutenant-Colonel John B. *Queen-Ann-ſtreet Eaſt*

Scholey,

Scholey, Mr. George, *Old Swan-ſtairs*
P Scott, David, Eſq. *Devonſhire-place*
Scott, Robert, Eſq. *Groſvenor-ſquare*
Scott, Hugh, Eſq. *Harley-ſtreet, Cavendiſh-ſquare*
Scott, Mr. Thomas, *Ludgate-hill*
††Seale, Mr. David, *Peckham*
Seddon, Mr. Thomas, *Alderſgate-ſtreet*
P Selby, Henry Collingwood, Eſq. *Twickenham-common, Middleſex*
Serra, Iſaac, Eſq. *King's-road, Gray's-inn-lane*
Sewell, Mr. John, *Cornhill*
Sewell, the Reverend George, *Byfleet, near Ripley, Surrey*
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P Shakeſpeare, Mr. George, *Oxford-ſtreet*
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P Shipley, Mr. William, Gent. *Maidſtone, Kent*
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P Shore, Samuel, jun. Eſq. *Lincoln's-inn*
Sibley, Joſeph, Eſq. *Market-ſtreet, Herts*
Simpſon, Mr. Thomas, *Chelſea Water-works*

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Simpkin, Mr. Thomas, *Strand*
Skinner, Thomas, Eſq. Alderman, *Alderſgate-ſtreet*
Skinner, William, Eſq. *Finſbury-ſquare*
P Skottow, Nicholas, Eſq. *Berners-ſtreet*
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Slade, John Moore, Eſq. *Chatham*
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† Smith, John Spencer, Eſq.
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Smith, Mr. John, *Lad-lane*
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Smith, Simmons Smith Joſhua, Eſq. *Batterſea, and Lamb's-conduit-ſtreet*
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Smith, Henry, Eſq. *Drapers-hall*
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Smith, Mr. Edward, *Broad-ſtreet, City*
††Smith, George, Eſq. *Lombard-ſtreet*
Smith, Eaglesfield, Eſq. *Great Queen-ſtreet*
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Songa, Anthony, Esq.
† Sparks, Robert, Esq. *St. John's street*
Sparkes, Joseph, Esq. *Red-lion-square*
Sparrow, Robert, Esq. *Portland-place*
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Spilsbury, Mr. Charles, *ditto*
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Splitgerber, Mr. Frederick, *ditto*
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Stonard, Nathaniel, Eſq. *Bow, Middleſex*
Storey, Robert, Eſq. *Bedford-ſquare*
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T.

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Tekell, John, Eſq. *Lamb's-buildings, Temple*
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Thomſon, Alexander, Eſq. *Somerſet-ſtreet*
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Thompſon, Mr. George, *Duke-ſtreet, York-buildings*
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Place the Print of Dr. Templeman as Frontiſpiece to the Volume.

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Mr. Simon Goodrichs's Eſcapement, to face page 333.

Mr. Featherſtonhaugh's Machine, to face page 338.

Sir Thomas Hanmer's Manner of laying Water on Water-Wheels, to face page 350.

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of Camberwell in the County of Surry.

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M.DCCC.

PREFACE.

THE addition of a greater number of very respectable persons as Members of the Society during the last Session than in many preceding, shews in a strong point of view the high estimation in which this Society stands with the World, at a period of forty-six years from its formation. The number of Candidates yet offering themselves, makes it appear that the ardour for improvements in the Arts, Manufactures, and Commerce of Great Britain and her Colonies, continues to act vigorously on the mind; and a consideration of the infinite advantages which the Public have derived from this Society, affords the pleasing prospect of its flourishing to the remotest ages.

The Funds of the Society have this Session received an addition of five hundred pounds from the legacy of the late Robert Nettleton, Esq. of Camberwell, whose portrait, from respect to his memory, the Society have ordered to form the Frontispiece of the present Volume.—They have also directed the following short account of the life of this excellent character to be added.

Mr. Nettleton was born at Hull, about the year 1694. His Father was a respectable merchant there, and successively discharged the offices of Chamberlain, Sheriff, and Mayor, in that town. He had a brother named James, who was a merchant at Stockholm, and perished by a remarkable accident, being blown up in a merchant-ship lying there, on board which the British factory were dining to celebrate the King's birth-day. Mr. Nettleton, on his first entrance into business, resided at Konigsberg in Prussia, and afterwards removed to St. Petersburg, where he was personally known to

to Peter the Great, its illustrious founder; from thence he came to settle in London, about the year 1735.

Blessed with a good natural understanding, improved by a classical education, he was conversant with the best Greek and Latin authors, and attentive to mathematical and other scientific studies. In all his transactions, he was most upright and honourable; in his turn of mind, calm and benevolent; warmly interested for the welfare of his country, kind and hospitable to his friends, and of so bountiful a disposition to the poor, that, during the whole course of his business, he set aside a tenth part of his profits for the purposes of charity; which plan he so much extended in his latter years, as to give away a fourth, or even a larger portion of his income.

Being related to the family of the famous Andrew Marvel, Esq. and desirous of recommending that patriotic character

to the imitation of other men, he placed a marble tablet to his memory in the church of St. Giles's in the Fields.

Mr. Nettleton presided for 25 years as Governor of the Russia Company in London, and was for some years a Director of the Bank of England; in which situations his disinterested conduct and distinguished moderation gained him the good opinion and respect of all persons with whom he had any intercourse.

Mr. Nettleton married Anne, one of the daughters of Sir Edward Becher, who was Lord-Mayor of London in 1729, by whom he left no issue: he died in July 1774, and lies interred in the parish of Camberwell.

He left by his will a certain sum of money to be invested in the stocks, as a part of the provision for his Widow; and after her death, he bequeathed £3,500 thereof to the following public charities and institutions:

The

The Small-pox Hospital	£.1000 0 0
Merchant Seamen's Corporation	1000 0 0
London Hospital	500 0 0
St. Thomas's Hospital	500 0 0
The Society for the encouragement of Arts, Manufactures and Commerce, of which he had been early a Member	500 0 0

The Widow of Mr. Nettleton survived him until the month of November, 1799; and, on her decease, the above-mentioned legacies were discharged by his remaining executor and trustee, Thomas Raikes, Esq. of New-Broad-Street, London.

A character so respectable as that of Mr. Nettleton will long be admired by posterity, and venerated by his countrymen.

The business of the Society, during the last Session, suffered some interruption by the loss of their late worthy Secretary, Mr. SAMUEL MORE, who died on the 11th of October, 1799, less a martyr to age than to infirmity, being worn out with almost perpetual attacks of the

gout, with which he had been for many years very heavily afflicted. His unwearied zeal for the interests of the Society, his great abilities in the execution of an office to which he had been enthusiastically devoted for near 30 years, and his extensive knowledge of every subject connected with the Institution, are well known, and must be gratefully acknowledged.

There is great reason to believe that some of the first Mechanicians and Manufacturers of this country have at different times been indebted to him for useful hints and observations. It is not proposed to enter here into the biography of this very excellent Officer, whose private worth was not inferior to his public virtues, because it is expected that a full account of him will be prefixed to the publication of some valuable papers, which, it is said, he has bequeathed to the World. He was buried in a family vault, belonging to the Chapel in the Broad-Way, Westminster, in the parish of

of St. Margaret's. His executors are George Philips Towry, Esq. one of the Commissioners of the Victualling-Office, and William Newcombe, Esq. of the Bank.

The loss of a man so able and so long-experienced in office, was naturally attended with some little embarrassment to the Society, more particularly as the election of his successor did not take place for some months after his decease; but the active exertions of Mr. Thomas Taylor, the assistant Secretary, well known for his endeavours to disseminate the Philosophy of Plato, aided by the voluntary assistance of the late Mr. George Wilson, of Bedford-street, Covent Garden, prevented impediments to the business of the Society.

The subsequent death of Mr. Wilson, who united the accomplishments of the gentleman and the scholar with the offices of friendship, will long call forth a tributary sigh from every person who was favoured with his acquaintance. No man

man ever had a greater regard for the Society, or was more attentive to its honour and its interest.

The present Secretary to the Society was elected in February last, but was scarcely called to active business till the month of March. His entrance upon this office will naturally be considered an arduous undertaking, when the merits and comprehensive abilities of his predecessor are remembered; but some candour and indulgence, on such an occasion, he certainly has a right to claim from the Society and the Public. In this and other kingdoms, he has had the opportunity to investigate such matters as are the peculiar objects of the Society; and his mind appears to be strongly impressed with a wish to discharge the duties of his office with propriety, energy and attention.

The death of the late Secretary, unavoidably occasioned some delay in the publication of the present volume. The arrangements of it will be found in nearly the

the same order, as in preceding years, and the Premiums not much different: some alterations in them are proposed to take place in the next Volume; and the patrons of the arts, and all ingenious men, are requested to address to Mr. Charles Taylor, the present Secretary of the Society, any hints of new Premiums for objects beneficial to the British Empire.

It is to be remembered, that the establishment of the Society is not on narrow views, or selfish interests. The series of Paintings by Mr. Barry, and the Models for which Premiums have been given, are open to public inspection *gratis*, and the grand object of the Society is the public good.

Under the class of Agriculture, will be found two new Premiums, this year, of very material consequence; namely, one for Spring-wheat, class 88; the other for early Beans, class 91. When the uncertainty of our climate is considered, and the frequent difficulties which the farmer meets with in getting his seed properly

perly in the ground in the autumn, or early winter months, it will be judged of great importance to learn the best methods of producing good crops from wheat sown in the spring season, and to ascertain the kinds most proper for the purpose. The Premium for Horse-beans is intended to point out the earliest varieties, with a view to allow as much time as possible to render land in good condition, for wheat to be sown thereon the same year. Upon similar well-grounded principles, the true spirit of agriculture is encouraged, extended, and improved.

In the department of Mechanicks, Class 218 *, the Premium for cleansing Chimneys, which had been some years omitted, will be found renewed. The great number of miserable objects which the late Mr. George Wilson, above mentioned, had met with in his practice, whose disorders and infirmities he had traced to their source, and found to originate from the common methods of sweeping

sweeping chimneys by children, called forth his usual philanthropy to seek out for some invention to answer the purpose, and to be less injurious to mankind. It is hoped that the Society's effort at this time will be successful.

The papers and communications of the present Volume are in general disposed in the usual manner, under their respective classes. The three last Papers, under the title of Additions in Agriculture, were thus placed, because the accounts had not been fully completed by the Gentlemen who presented them, before the preceding articles in some of the other Classes had been printed off.

Under the class of Agriculture, at the commencement of the Volume, it will be found that the Right Honourable the Marquis of Titchfield has made great and very commendable exertions in planting Acorns.

Thomas Johnes, Esq. has been very successful in planting Larch-trees: few trees are more generally useful, or more durable

durable than the Larch. It is to be observed, that this Gentleman has not confined himself to this kind of timber only; but has entered into an immense extent of general plantations, of which it is probable notice will be taken at a future period.

The communication of the Rev. William Smith, on the planting of Timber-trees, will be found clear and satisfactory: it is pleasing to announce, that the great national object of raising timber has been lately much attended to in other parts of the Kingdom.

Orchardists will receive much valuable information from Mr. Lake's paper, which contains an accurate detail of practical knowledge on the subject of Orchards.

Mr. John Cartwright's paper upon the culture of Beans and Wheat, well deserves attention, both from the mode of execution, and because such a system of agriculture precludes the necessity of losing a crop by a summer fallow; the beans

beans leaving the land in a state fit for wheat to be sown thereon the same year.

The culture and qualities of English Rhubarb are fully ascertained by the account furnished by Mr. Thomas Jones on this subject.

The mode of improving Waste Moors has been laid down with great judgement and discrimination in Mr. John Mirehouse's paper on the cultivation of Waste Land, and will form a good example to be followed in similar circumstances. The mind is here naturally led to consider the immense benefit which would accrue to this nation, if attention were paid to the general improvement of the waste land in Great Britain. It may be proved, from actual observation, that there is no land, however in appearance sterile or unfavourable, but is capable of great improvement, at a less expence than is generally conceived. In this case it becomes highly necessary to judge from comparison

comparison, what are the best articles for growth in particular soils and situations, to observe the natural products of the soil, and to take Nature by the hand in her several operations. It must have given peculiar pleasure, to have lately witnessed, in several parts of this kingdom, large crops of wheat and oats waved by the gentle breeze, in varied forms, upon lands which had been deemed inaccessible morasses, or had remained uncultivated for ages.

It is earnestly wished that similar examples may become objects of universal attention and imitation.

The improvements of the Rev. H. B. Dudley, in gaining Land from the Sea, appear to have been conducted with great judgment, and contribute, upon the principles above mentioned, to the advantages of this kingdom.

Mr. Jones, in his paper upon Opium, has clearly proved that Opium of excellent quality may be produced in Great Britain. His observations confirm experiments

periments, which had been previously made upon a smaller scale by Dr. De Salis.

Whatever the public opinion may be upon the benefits likely to arise to this country, from cultivating Poppies in England, for the production of Opium, yet it is well to have clearly ascertained that they will yield here large quantities of good Opium.

At the head of Mechanicks, the late Mr. Bowes's discovery of a Quarry of Mill-stones in Wales, resembling the French Burrs, is of material consequence, especially on consideration of the precarious situation of this country, when lately dependent upon France for so necessary an article. True national policy will always endeavour to produce within the limits of our own country, whatever is necessary for our maintenance and support.

The public attention has been much engaged about the acquisition of a Flour-mill, so constructed as to enable Families

or small Villages to grind their own corn at little expence. Those persons who reside in the country, at a distance from a common Corn-mill, know the necessity of such an invention; and to such, it is expected the Hand-mill invented by Mr. Thomas Rustall will be found of great importance.

The Bolter invented by him, and which is also described, will not only answer the purpose of separating flour from bran, but will be very advantageous to Colour-makers, Druggists, and others in those branches of business where articles of value require to be sifted, or where noxious particles should be avoided in the operation.

The management of heat has been lately a topic of general conversation, and many attempts have been made to improve Ovens, and to save Fuel.

The Oven lately invented by Mr. Holmes, is well adapted for economy, and the service of private families. The

Society

Society have been very attentive to examine its advantages, by repeated experiments, the results of which have declared much in its favour. It is not sufficient, in mechanical inventions, that they will succeed with care; it is also necessary that no additional trouble shall arise to the servants employed about them; otherwise the best inventions will be liable to miscarry. No previous preparation is required in the management of Mr. Holmes's Oven, no extra fire to be made underneath it, or flues to be cleared from smoke and ashes.

If once well fixed in brick-work, it heats with the morning fire, and retains during the whole day, by its contact with the common fire, sufficient heat for general culinary purposes. It will probably be deemed as essential to a family kitchen as the most common utensils there.

The repeated accidents which arise to horses drawing loaded carts, have induced

the Society to consider the means of preventing them; and with this view they have inserted Mr. John Snarts's invention, which will also afford some advantages, by admitting an additional extent to the body of the cart for loads which require room.

A very ingenious Chest-lock, by Mr. Arkwright, will be found to deserve the public notice, it being one of the best means hitherto devised for securing property against picklocks or unfaithful servants.

Mr. Bullock's Lever Lock-bolt is peculiarly well contrived for folding-doors, and for saving trouble to domestics.

The great dangers which arise to passengers in carriages, from horses taking fright, occasioned a Premium to be offered for preventing such accidents: this called forth the ingenuity of Mr. Davis, who, by very curious mechanism, has contrived to detach the horses instantly when required from carriages, and to

stop

stop at the same time the motion of the fore-wheels.

Mr. Clulow's figured Ribband-loom will suggest improvements in the manufacture of Ribbands; many other ingenious contrivances in the figured line of weaving have been completed in other parts of the kingdom.

The astonishing inventions of his Grace the Duke of Bridgewater, on his Canals, are beyond the conceptions of those persons who have not been eye-witnesses to their powers and effects. The Rev. H. Egerton has obligingly favoured the Society, this year, with a description and plan of that stupendous undertaking, the subterraneous inclined plane, projected by, and executed under the immediate inspection of his Grace.

The memory of his Grace will ever be respected as the founder of Inland Navigation in this kingdom; and his clearness of understanding, and strength

of

of mind, have enabled him to conquer difficulties deemed insuperable.

In testimony of great respect for his Grace's merits, the Society have, this Session, presented to him their Gold Medal, thus inscribed: *To his Grace the Duke of Bridgwater, for his great exertions in Inland Navigations.*

It is scarcely credible to what an extent of noble emulation the Society have from time to time given rise, or to form a sufficient estimate of the numerous advantages which the public have ultimately derived from them.

The works of a Barry and a Bacon, which decorate the great Room of the Society, are examples of these exertions. The bold enterprise of Mr. Mackenzie, in traversing the wilds of North America, related in this Volume, is a similar instance in another line of trial; and many others could be adduced.

Under the head of Additions in Agriculture, Mr. Bucknall's paper, relative to

to the causes of Blight on Fruit-trees, may be considered as a continuation of that series of observations on Orcharding, which that indefatigable and attentive Gentleman has for many years furnished to the Society: the present paper throws much light on the destructive powers of insects.

The observations by Mr. John Taylor, upon the Beet-plant, and the best methods practised in Germany, for extracting Sugar from its root, became an object of the Society's attention, from a consideration of the various purposes, in Arts and Manufactures, to which its leaves, its juices, and its roots, can be applied. It is a material branch of the Society's institution to elucidate the advantages which Great Britain actually does possess, or to point out such as she may procure within herself, without being dependent upon Foreign Nations; and in this view the culture of the Beet-plant may be of great consequence.

The

The very valuable Paper received from Mr. Wakefield, on the powers of Steam, in promoting Vegetation, contains a minute detail of many curious facts, extremely interesting to the naturalist, along with an accurate plan of a Steam-House constructed in the manner he recommends. A variety of remarks on the theory of this process, which have been communicated by him to the Secretary, are at present omitted, owing to the Volume containing already a greater quantity of letter-press than usual, and the account now given being of itself considerable in extent.

Mr. Wakefield's general knowledge in agriculture and horticulture is exemplified by accurate practice, and admirably illustrated by his extensive improvements upon Trafford-moss, near Manchester, which will be found well worthy the inspection of those persons who visit that neighbourhood.

Amongst a variety of information on different subjects received by the Society,

but

but not inserted in the present Volume, the Rev. W. Hoskins's discovery of an Iron-mine in Cornwall, the Ore of which is proper for making excellent Steel, should not pass unnoticed. By Mr. Hoskins's account, this Ore contains from 25 to 30 per cent. of iron, much argillaceous earth, small quantities of gold, silver and copper, and a little calcareous earth: he stated that the specific gravity of the iron is in the proportion of 7,654, estimating water at 1000; that he knew no other English Ore capable of producing Steel equal to his specimens; that the metal retains its malleability, whether hot or cold, and was in either case equally tough; that the mine extends superficially above five acres, is within 3 feet of the surface, and in a load from 40 to 60 feet in depth. In support of his observations, he laid before the Society various excellent steel instruments, made from this iron, and authentic certificates of its merit.

Before this summary account of the transactions of the Society is concluded, it is proper to notice the death, in August last, of the worthy and ingenious Mrs. Montague, who had been a member of the Society above fifteen years.

The present Session has added some Ladies of great merit to the list of Members; and, doubtless, more will wish to be elected, when it is remembered that female accomplishments have been long favoured by the attentions and rewards of the Society. The funds of the Society are in a flourishing state; and the ingenious of both sexes, and of every description, are invited to lay their inventions or improvements before the Society, who extend their liberality far beyond the objects published in their list of Premiums. True merit will ever meet with their patronage and encouragement; and the names of those persons whose endeavours receive their sanction, will be handed down to posterity, as contributors to the public welfare of their country.

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PREMIUMS

OFFERED BY THE

SOCIETY

INSTITUTED AT LONDON,

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES,

AND

COMMERCE,

IN

THE YEAR M.DCCC.

TO THE PUBLIC.

ADELPHI-BUILDINGS,
April 10, 1800.

THE chief objects of the attention of the Society for the encouragement of Arts, Manufactures, and Commerce, in the application of their Rewards, are, ingenuity in the several branches of POLITE and LIBERAL ARTS, uſeful Diſcoveries and Improvements in AGRICULTURE, MANUFACTURES, MECHANICKS, and CHEMISTRY, or the laying open any ſuch to the Public; and, in general, all ſuch uſeful Inventions, Diſcoveries, or Improvements (though not mentioned in the Book of Premiums), as may appear to have a tendency to the advantage of Trade and Commerce. The Society therefore, in purſuance of their plan, propoſe to beſtow the following Premiums.

Premiums for Planting and Husbandry.

Class 1. ACORNS. For having set, between the first of October, 1799, and the first of April, 1800, the greatest quantity of land, not less than ten acres, with Acorns, with or without seeds, cuttings, or plants of other trees; at the option of the Candidate; and for effectually fencing and preserving the same, in order to raise timber; the GOLD MEDAL.

2. For the second greatest quantity of land, not less than five acres, set agreeably to the above conditions, the SILVER MEDAL.

CERTIFICATES of setting agreeably to the above conditions, and that there are not fewer than three hundred young Oaks on each acre, to be delivered to the Society on or before the first Tuesday in December, 1800.

3, 4. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in December, 1801.

5, 6. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in December, 1802.

7, 8. The same premiums are extended one year further.

CER-

CERTIFICATES to be produced on or before the first Tuesday in December, 1803.

N. B. It is the particular wish of the Society, that such lands only as are not calculated for growing Corn should be employed for the purposes specified in this advertisement.

9. RAISING OAKS. To the person who shall have raised, since the year 1796, the greatest number of Oaks, not fewer than five thousand, either from young plants or acorns, in order to secure a succession of oak timber in this kingdom; the GOLD MEDAL.

10. For the next greatest number, not fewer than three thousand, the SILVER MEDAL.

CERTIFICATES that there were on the land, at least the number of young Oak-trees required, in a thriving condition, two years after the planting, with an account of the methods pursued in making and managing the plantation, to be produced to the Society on or before the first Tuesday in January, 1801.

11, 12. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1802.

13, 14. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1803.

N. B. It is the particular wish of the Society, that such lands only as are not calculated for growing Corn, should be employed for the purposes specified in this advertisement.

15. ASCERTAINING THE BEST METHOD OF RAISING OAKS. To the person who shall ascertain in the best manner, by actual experiments, the comparative merits of the different modes of raising Oaks for timber, either from acorns set on land properly grubbed and tilled; from acorns sown at random among bushes, fern, or other cover; or from young plants, previously raised in nurseries, and transplanted; regard being had to the expence, growth, and other respective advantages of the several methods; the GOLD MEDAL.

The ACCOUNTS, and proper CERTIFICATES that not less than one acre has been cultivated in each mode, to be produced to the Society on or before the first Tuesday in November, 1800.

16. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in November, 1801.

17. CHESNUTS. For having sown or set, between the first of October, 1799, and the first of April, 1800, the greatest quantity of dry loamy land, not less than six acres, with Spanish Chesnuts, with or without seeds, cuttings, or plants of other trees adapted to such soil, at the option of the Candidate; and for effectually fencing and preserving the same, in order to raise timber; the GOLD MEDAL.

18. For

18. For the second greatest quantity, not less than four acres, the SILVER MEDAL.

CERTIFICATES of sowing or setting agreeably to the above conditions, and that there are not fewer than three hundred Chesnut plants, in a thriving state, on each acre, to be delivered to the Society on or before the first Tuesday in November, 1800.

19, 20. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1801.

21, 22. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1802.

23, 24. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in November, 1803.

25. ELM. For having planted the greatest number of the English Elm, not less than eight thousand, between the twenty-fourth of June, 1798, and the twenty-fourth of June, 1799; and for the having effectually fenced and preserved the same, in order to raise timber; the GOLD MEDAL.

26. For the second greatest number, not less than five thousand, the SILVER MEDAL.

CERTIFICATES of the having planted agreeably to the above conditions, that the plants were in a healthy and thriving state two years at least after making the plantation, and specifying the distance of the plants, to be delivered to the Society on or before the first Tuesday in April, 1801.

27, 28. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in April, 1802.

29, 30. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in April, 1803.

31, 32. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in April, 1804.

33. LARCH. For having planted out between the twenty-fourth of June, 1797, and the twenty-fourth of June, 1798, the greatest number of Larch-trees, not fewer than five thousand; and for having effectually fenced and preserved the same, in order to raise timber; the GOLD MEDAL.

34. For the next greatest number, not fewer than three thousand, the SILVER MEDAL.

CER-

CERTIFICATES of the number of plants, that they were in a healthy and thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1800.

35, 36. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1801.

37, 38. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1802.

39, 40. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1803.

41, 42. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1804.

N. B. The Larch-trees may be either planted, mixed with other trees, or by themselves, as may best suit the convenience of the planter.

43. SILVER FIR. For having planted out, between the twenty-fourth of June, 1796, and the twenty-fourth of

of June, 1797, in a mixed plantation of Forest-trees, or separate, according to the option of the Candidate, the greatest number of Silver Firs, not fewer than two thousand; and for having effectually fenced and preserved the same, in order to raise timber; the GOLD MEDAL.

44. For the next greatest number, not fewer than one thousand, the SILVER MEDAL.

CERTIFICATES of the number of plants, that they were in a healthy and thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1800.

45, 46. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1801.

47, 48. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in December, 1802.

49. OSIERS. To the person who shall have planted, between the first of October, 1799, and the first of May, 1800, the greatest quantity of land, not less than five acres, with those kinds of Willows, commonly known by the names of Osier, Spaniard, New-kind, or French, fit for the purpose of basket-makers, not fewer than twelve thousand plants on each acre; the GOLD MEDAL, or THIRTY GUINEAS.

50. For

60. For the second greatest quantity of land, not less than three acres, the SILVER MEDAL, or TEN GUINEAS.

CERTIFICATES of the planting, and that the plants were in a thriving state five months at least after the planting, to be produced to the Society on or before the last Tuesday in November, 1800.

51, 52. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the last Tuesday in November, 1801.

53. ALDER. For having planted, in the year 1797, the greatest number of Alders, not less than three thousand, the GOLD MEDAL.

CERTIFICATES of the number of plants, and that they were in a thriving state two years at least after being planted, to be delivered to the Society on or before the last Tuesday in December, 1800.

54. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1801.

55. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1802.

56. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1803.

57. ASH.

57. ASH. For having sown or set, in the year 1797, the greatest quantity of land, not less than six acres, with Ash for timber, with or without seeds, cuttings, or plants of such other trees as are adapted to the soil; the GOLD MEDAL.

58. For the next greatest quantity, not less than four acres, the SILVER MEDAL.

CERTIFICATES of the sowing or setting agreeably to the above conditions; that there are not fewer than one hundred Ash plants on each acre, in a thriving and healthy condition, two years at least after the sowing or setting, with a general account of the methods used in making the plantation; to be delivered to the Society on or before the last Tuesday in December, 1800.

59, 60. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1801.

61, 62. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1802.

63, 64. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1803.

65, 66. The same premiums are extended one year further.

CERTIFICATES to be delivered on or before the last Tuesday in December, 1804.

67. TIMBER-TREES. To the person who shall have enclosed, planted, or sown, the greatest number of acres, not less than ten, with the best sorts of Forest-trees, adapted to the soil, for timber, between the firſt of October, 1796, and the first of May, 1798; the GOLD MEDAL.

An account of the methods used in making the plantations, and of the nature of the soil, together with proper CERTIFICATES that the trees were in a thriving and healthy state two years at least after making the plantation, to be delivered to the Society on or before the first Tuesday in November, 1800.

68. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in November, 1801.

69. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in November, 1802.

70. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in November, 1803.

N. B. With

N. B. With the above Forest-trees, the seeds, cuttings, or plants, of such other trees as are adapted to the soil, and proper for underwood, may or may not be intermixed.

71. PLANTING ORCHARDS. To the person who shall plant an Orchard after the month of August in the year 1797, in the most judicious manner, not less than four acres; the GOLD MEDAL, or FIFTY GUINEAS.

72. For the next in merit, the SILVER MEDAL, or THIRTY GUINEAS.

The proof of the value of the improvement of the Orchard shall depend on the clear product of the greatest quantity of fine marketable fruit, to be produced during three successive years after the year 1813, and sold at any public market in England or Wales. Each person who proposes to become a Candidate for these Premiums must send an account of the number of trees, their culture, pruning, and every circumstance which can in the least throw any light on the subject; which information will be registered, with a view to form a system of rational culture.

73. And that Gentlemen may be induced to come forward, and to make and preserve such plantation,—The person who can produce an ORCHARD which, at the end of three years after planting, shall shew the greatest promise of success, shall be entitled to the GOLD MEDAL, or THIRTY GUINEAS.

The merits of the two first-mentioned Premiums being to be ascertained by the fruit; the merit of the third premium must be ascertained by the judicious number of trees planted, the straitness, clearness, and freedom of growth of the

the several trees; and that all the young branches run free, and at due distance from each other, without any galling or canker.

CERTIFICATES of the forming the Orchard, the soil and aspect of the plantation, the sale and product of the fruit for which the claims for the Premiums, Classes 71 and 72, are intended to be made, must be delivered to the Society on or before the first Tuesday in November, 1816: and the Certificate in claim of the Premium, Class 73, must be delivered to the Society on or before the first Tuesday in November, 1800.

N. B. However expert the Orchardist may be in general information and attention, much will depend on soil, exposure, culture, and an easy communication to convey the fruit to market; for every field, however valuable in other respects, may not be proper for an Orchard.

Any wood the Orchardist may choose to raise for shelter to such plantation, is not to be measured as part of the Orchard, as the wood will more than support its own expence.

74, 75, 76. The foregoing Premiums for Orchards, from Class 71 to Class 73 inclusive, are extended one year further. The claims for the Premiums, Classes 71 and 72, to be delivered to the Society on or before the first Tuesday in November, 1817; and the Certificate in claim of the Premium, Class 73, must be delivered on or before the first Tuesday in November, 1801.

*** *The Candidates for planting all kinds of Trees are to certify, that the respective Plantations are properly fenced and secured, and particularly to state the condition the plants were in at the time of signing such Certificate.*

Any

Any information which the Candidates for the foregoing Premiums may choose to communicate, relative to the methods made use of in forming the Plantation, or promoting the growth of the several Trees, or any other observations that may have occurred on the subject, will be thankfully received.

77. SECURING PLANTATIONS OF TIMBER-TREES. To the person who shall give to the Society the most satisfactory Account, founded on experience, of the most effectual and least expensive method of securing young plantations of Timber-trees from Hares and Rabbits, as well as Sheep and larger cattle, which at the same time shall be least subject to the depredations of wood-stealers; the SILVER MEDAL, or TWENTY GUINEAS.

The ACCOUNTS, and CERTIFICATES of the efficacy of the method, to be produced to the Society on or before the first Tuesday in November, 1800.

78. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in November, 1801.

79. PREVENTING THE BLIGHT ON FRUIT-TREES. To the person who shall discover to the Society the best and most effectual method of preventing the Blight on Fruit-trees, superior to any hitherto known or practised, and verified by actual and comparative experiments; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be delivered to the Society on or before the second Tuesday in November, 1800.

80. The

80. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in November, 1801.

81. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in November, 1802.

82. TAKING OFF THE ILL EFFECTS OF BLIGHTS. To the person who shall discover to the Society the best and most effectual method of taking off the ill effects of Blights on Fruit-trees, superior to any hitherto known or practised, and verified by actual and comparative experiments; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1801.

83. COMPARATIVE CULTURE OF WHEAT. For the best set of experiments, made on not less than eight acres, four of which to be sown broad-cast, and four drilled, to ascertain whether it is most advantageous to cultivate Wheat by sowing it in the common broad-cast way, or by drilling it in equidistant rows, hoeing the intervals; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

It is required that an account of the expence attending each mode of culture, with proper CERTIFICATES of the nature and condition of the land on which the experiments are made, together with an account of the produce of the Corn, be produced to the Society on or before the first Tuesday in February, 1801.

84. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in February, 1802.

85. COMPARATIVE CULTURE OF WHEAT. For the best set of experiments, made on not less than eight acres of land, four of which to be sown broad-cast, and four dibbled, to ascertain whether it is most advantageous to cultivate Wheat by sowing it in the common broad-cast way, or by dibbling it in equidistant rows, hoeing the intervals; the GOLD MEDAL, or the SILVER MEDAL and THIRTY GUINEAS.

It is required that an account of the expence attending each mode of culture, with proper certificates of the nature and condition of the land on which the experiments are made, together with an account of the produce of the Corn, be produced to the Society on or before the first Tuesday in February, 1801.

86. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in February, 1802.

87. BEANS AND WHEAT. To the person who shall have planted or drilled, between the first of December, 1798, and the first of April, 1799, the greatest quantity of land, not less than ten acres, with Beans, and shall have sown the same land with Wheat in the same year 1799; TWENTY GUINEAS.

It is required that an account of the sort and quantity of Beans, the time of planting or drilling, and of reaping or mowing them, the produce per acre threshed, the

the application of the straw, the expence of planting or drilling, hand or horse hoeing, the distance of the rows, and the quality of the soil, together with CERTIFICATES of the number of acres, and that the land was actually sown with Wheat in the year 1799, be produced on or before the first Tuesday in November, 1800.

88. SPRING WHEAT. To the person who, in the year 1800, shall cultivate the greatest quantity of Spring Wheat, not less than ten acres, the SILVER MEDAL, or TWENTY GUINEAS.

It is required that the time of sowing and reaping be noticed; also a particular account of the species, cultivation, and expence attending it, with proper certificates of the nature and condition of the land on which the experiments were made, and the name of the crop, if any, which the same land bore the preceding year, together with an account of the produce, the weight per Winchester bushel, and a sample, not less than a quart, be produced to the Society on or before the second Tuesday in December, 1800.

N. B. The Society have been informed from respectable authority, that some of this kind of Wheat was sown in the year 1799, so late as the first week in May, and reaped in less than four months afterwards. It is supposed that the cultivation of Spring Wheat would not only allow more time to till the land, but less for the growth of weeds; thus rendering the Wheat crop as clean as a Barley crop, and exhausting the soil much less than by autumnal sowing.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in December, 1800.

89. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in December, 1801.

90. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the second Tuesday in December, 1802.

91. BEANS. To the person who, in the year 1800, shall discover and cultivate, either by the drill or dibbling method, on not less than five acres, a species of Horse Beans or Tick Beans, that will ripen their seeds before the first of August, the SILVER MEDAL, or TWENTY GUINEAS.

It is required that a particular account of the Bean, the cultivation, and the expence attending it, with proper certificates of the nature and condition of the land on which the experiments are made, together with an account of the produce, the weight per Winchester bushel, and a sample of not less than a quart, be produced to the Society on or before the first Tuesday in December, 1800.

It is apprehended that if a Bean should be brought into cultivation with the habits of the Hotspur or other early Peas, that it would, in a great measure, escape the danger arising from the Collier insect, or other insects, and allow more time for the farmers to till the land for the subsequent crop of Wheat.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in December, 1800.

92. The

92. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in December, 1801.

93. TURNEPS. For the best account of experiments made on at least six acres of land, to determine the comparative advantage of the drill or broad-cast method in the cultivation of Turneps; the GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be delivered on or before the third Tuesday in March, 1801.

It is required that one half of the land be drilled, and the other half sown broad-cast.

94. VEGETABLE FOOD. For the best account, confirmed by experiments, of the Vegetable Food (Cabbages and Turneps excepted), growing in the months of March and April, that will most increase the milk in Mares, Cows, and Ewes, at that season; provided such food can be cultivated at an expence that will admit of its being applied to the above purposes; the GOLD MEDAL, or the SILVER MEDAL and TEN GUINEAS.

CERTIFICATES to be produced on or before the second Tuesday in November, 1800.

95. CULTIVATING ROOTS AND HERBAGE FOR FEEDING SHEEP AND BLACK CATTLE. For the most satisfactory experiments, made between Michaelmas, 1799, and the first of May, 1800, in order to ascertain which of the following plants can be culti-

vated and housed, or otherwise secured for winter-fodder, to the greatest advantage, viz.

Cole,	Turneps,
Turnep-rooted Cabbage,	Carrots,
Beets,	Parsneps,
Swedish Turneps,	Potatoes;

the GOLD MEDAL.

The ACCOUNTS, with proper CERTIFICATES, to be produced on or before the first Tuesday in November, 1800.

It is required that the above roots be taken off the land by the last day of October, 1799; that a crop of Wheat may be sown on the same ground, and the particulars of the sowing and planting, taking up, produce, preserving, and application to the feeding Sheep and Black Cattle, be specified. The comparative experiments must be made between two or more of any of the above-mentioned plants, and not less than one acre be cultivated with each particular kind of plant.

N. B. Great advantage will arise from the conveniency of keeping large flocks of Sheep, and herds of Cattle, if the difficulty of supporting them through the winter was obviated by a due knowledge of this practice.

It is recommended that experiments be made, and communicated to the Society, on the preservation of Turneps and other roots, in a mode similar to that by which Potatoes are preserved in ridges, tumuli, or hillocks, upon the ground where grown.

96. PARSNEPS. To the person who, in the year 1800, shall cultivate the greatest quantity of land, not less than five acres, with Parsneps, for the sole purpose of feeding Cattle or Sheep; the GOLD MEDAL, or THIRTY GUINEAS.

CER-

CERTIFICATES of the quantity of land so cultivated, with a particular account of the nature and quality of the soil and produce, and also of the condition of the Cattle or Sheep fed with the Parsneps, and the advantages resulting from the practice, to be produced to the Society on or before the second Tuesday in February, 1801.

97. MAKING MEADOW HAY IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of making Meadow Hay in Wet Weather; the GOLD MEDAL, or THIRTY GUINEAS.

A full account of the method employed; and of the expence attending the process, with not less than fifty-six pounds of the Hay; and Certificates that at least the produce of six acres of land has been made according to the method described, and that the whole is of equal quality with the samples; to be produced on or before the first Tuesday in January, 1801.

98. HARVESTING CORN IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of harvesting Corn in Wet Weather; the GOLD MEDAL, or THIRTY GUINEAS.

A full account of the method employed, and of the expence attending the process, with not less than two Sheaves of the Corn, and Certificates that at least the produce of four acres has been harvested according to the method described, and that the whole is of equal quality with the samples, to be produced on or before the first Tuesday in January, 1801.

99. CULTIVATING THE TRUE RHUBARB. For having raised, before the end of the year 1800, the greatest number of plants, not less than two thousand, of Rheum Palmatum, or true Rhubarb, the GOLD MEDAL, or THIRTY GUINEAS.

CERTIFICATES of the number of plants, that they stand at least four feet asunder, that they have been in a thriving state during the preceding summer; with an account of the soil, culture, and aspect; to be produced on or before the second Tuesday in February, 1801.

100. ASCERTAINING THE COMPONENT PARTS OF ARABLE LAND. To the person who shall produce to the Society the most satisfactory set of experiments, to ascertain the due proportion of the several component parts of Arable Land, in one or more Counties in Great Britain, by an accurate analysis of it; and who, having made a like analysis of some poor land, shall, by comparing the component parts of each, and thereby ascertaining the deficiencies of the poor soil, improve a quantity of it, not less than one acre, by the addition of such parts as the former experiments shall have discovered to be wanting therein, and therefore probably the cause of its sterility; the GOLD MEDAL, or FORTY GUINEAS.

It is required that the manurings, ploughings, and crops of the improved land, be the same after the improvement as before; and that a minute account of the produce in each state, of the weather, and of the various influencing circumstances, together with the method made use of in analysing the soils, be produced, with proper CERTIFICATES, and the chemical results of the analysis, which are to remain the property of the Society, on or before the last Tuesday in November, 1800.

It

It is expected that a quantity, not less than six pounds, of the rich, of the poor, and of the improved soils, be produced with the Certificates.

101. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the last Tuesday in November, 1801.

102. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the last Tuesday in November, 1802.

103. IMPROVING LAND LYING WASTE. For the most satisfactory account of the best method of improving any of the following soils, being land lying waste or uncultivated, viz. Clay, Gravel, Sand, Chalk, Moor or Peat-earth and Bog; verified by experiments on not less than fifty acres of land; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

104. For the next greatest quantity of Land, not less than twenty-five acres, the SILVER MEDAL and TEN GUINEAS.

be produced, with proper CERTIFICATES, on or before the second Tuesday in December, 1800.

The soil, manner of improvement, expence, and produce, together with an account of the uses the improved land has been applied to, are required to be fully explained.

105, 106. The same premiums are extended one year further.

The ACCOUNTS to be produced on or before the second Tuesday in December, 1801.

107,

107, 108. The same premiums are extended one year further.

The ACCOUNTS to be produced on or before the second Tuesday in December, 1802.

N. B. In all claims for this premium, of this or subsequent dates, it will be expected that the Claimants produce some experiments of such a new kind, as the Society have not granted rewards for.

109. MANURES. For the most satisfactory set of experiments, to ascertain the comparative advantages of the following Manures, used as Top-dressings, on Grass or Corn Land, viz. Soot, Coal-ashes, Wood-ashes, Lime, Gypsum, Night-soil, or any other fit article; the GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS.

It is required that the above experiments be made between two or more of the above-mentioned Manures, and that not less than two acres of land be dressed with each Manure. An account of the nature of the soil, quantity and expence of the Manure and Crops, with CERTIFICATES, to be produced on or before the last Tuesday in February, 1801.

110. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the last Tuesday in February, 1802.

111. IMPROVING WASTE MOORS. For the improvement of the greatest number of acres of Waste Moor-Land, not less than one hundred, the GOLD MEDAL.

It

It is required that the land before improvement be absolutely uncultivated, and in a great measure useless; that in its improved state it be inclosed, cultivated, and divided into fields, sufficient for the use and occupation of a tenant.

112. For the next greatest quantity, not les than fifty acres, the SILVER MEDAL, or TWENTY GUINEAS.

113. For the next greatest quantity, not less than twenty-five acres, the SILVER MEDAL, or TEN GUINEAS.

CERTIFICATES of the number of acres, of the quality of the Moor so improved, of the mode and expence of the improvement, the state it is in as to the proportion of grass to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1801.

114, 115, 116. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1802.

117, 118, 119. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1803.

120, 121, 122. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in February, 1804.

123.

123. GAINING LAND FROM THE SEA. To the person who shall produce to the Society an account of the best method, verified by actual experiment, of gaining Land from the Sea, not less than twenty acres, on the coast of Great-Britain, the GOLD MEDAL.

CERTIFICATES of the quantity of Land, and that the experiments were begun after the first of January, 1795, to be produced to the Society on or before the first Tuesday in October, 1800.

124. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in October, 1801.

125. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in October, 1802.

126. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in October, 1803.

127. MACHINE FOR DIBBLING WHEAT. To the person who shall invent the best Machine, to answer the purpose of Dibbling Wheat, by which the holes for receiving the Grain may be made at equal distances and proper depths, the grain regularly delivered therein, and effectually covered; the SILVER MEDAL, or TWENTY GUINEAS.

The MACHINE, with CERTIFICATES that at least three acres have been dibbled by it, to be produced to the Society on or before the second Tuesday in January, 1801.

Simplicity

Simplicity and cheapness in the construction will be considered as principal parts of its merit.

128. MACHINE TO ANSWER THE PURPOSE OF REAPING OR MOWING CORN. For inventing a Machine to answer the purpose of mowing or reaping Wheat, Rye, Barley, Oats, or Beans, by which it may be done more expeditiously and cheaper than by any method now practised, provided it does not shed the corn or pulse more than the methods in common practice, and that it lays the straw in such a manner that it may be easily gathered up for binding; the GOLD MEDAL, or THIRTY GUINEAS.

The MACHINE, with CERTIFICATES that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1800. Simplicity and cheapness in the construction will be considered as principal parts of its merit.

129, DESTROYING THE GRUB OF THE COCK-CHAFER. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the Grub of the Cock-chafer, or of preventing or checking the destructive effects which always attend Corn, Peas, Beans, and Turneps, when attacked by those insects; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be produced on or before the first Tuesday in January, 1801.

130. DESTROYING THE WIRE-WORM. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying

destroying the insect called the Wire-Worm, or of preventing or checking the destructive effects which always attend Corn, Beans, Peas, or Pulse, when attacked by those insects; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES, to be produced to the Society on or before the the first Tuesday in January, 1801.

131. DESTROYING THE FLY ON HOPS. To the person who shall discover to the Society an easy and efficacious method of destroying the Fly on Hops, superior to any hitherto known or practised, on not less than six acres of Hop-ground, the GOLD MEDAL, or THIRTY GUINEAS.

ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1801.

132. DESTROYING CATERPILLARS ON FRUIT-TREES AND CULINARY PLANTS. To the person who shall discover to the Society an easy and efficacious method of destroying Caterpillars on Fruit-trees, and Culinary Plants, superior to any hitherto known or practised, on an Orchard or Garden of not less than two acres, the GOLD MEDAL, or THIRTY GUINEAS.

ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1801.

133. CURE OF THE ROT IN SHEEP. To the person who shall discover to the Society the best and most effectual method of preventing the Rot in Sheep, verified by repeated and satisfactory experiments, the GOLD MEDAL, or FIFTY GUINEAS.

It

It is expected that the Candidates furnish accurate accounts of the nature, symptoms, and cure of the disease, together with the imputed cause thereof, and the actual or probable means of prevention, which, with proper CERTIFICATES, must be delivered to the Society on or before the first Tuesday in February, 1801.

134. PREVENTING AND CURING THE ILL EFFECTS OF THE FLY ON SHEEP. To the person who shall discover to the Society the most effectual method of preventing and curing the ill effects of the Fly on Sheep, the SILVER MEDAL, or TWENTY GUINEAS.

It is required that the method be ascertained by repeated experiments, and that a CERTIFICATE of its efficacy be delivered to the Society on or before the first Tuesday in December, 1800.

135. PROTECTING SHEEP. To the person who, in the year 1800, shall protect the greatest number of Sheep, not fewer than five hundred, in bad seasons, by housing them in hovels or sheds; and give the most satisfactory acount, verified by experiment, of the advantages arising from the practice of defending Sheep from the inclemency of the weather, by such hovels or sheds; the SILVER MEDAL, or TWENTY GUINEAS.

A particular account of the experiments made, with the advantages arising therefrom, together with the expence, and CERTIFICATES of its utility, to be produced to the Society on or before the first Tuesday in March, 1801.

136. The same premium is extended one year further.

The

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in March, 1802.

N. B. It is at the option of the Candidates to have their hovels fixed, or moveable; and it is required, that the CERTIFICATES shall specify the length of time the Sheep were under cover, and the manner in which they were maintained during that time; together with the general method of managing them in the said hovels.

137. IMPROVING THE CONDITION OF THE LABOURING POOR, BY ERECTING COTTAGES, AND APPORTIONING LAND. To the person who, in the year 1800, shall erect the greatest number of Cottages for the accommodation of the Labouring Poor, and apportion not less than two acres of Land to each Cottage; the GOLD MEDAL.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1801.

138. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1802.

139. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered to the Society on or before the first Tuesday in February, 1803.

140. IMPROVING THE CONDITION OF THE LABOURING POOR, BY APPORTIONING LAND TO

TO COTTAGES. To the person who, in the year 1800, shall apportion to the greatest number of Cottages already built upon his or her estate, any quantity of Land, not less than two acres to each Cottage, for the better accommodation of the respective inhabitants; the GOLD MEDAL.

The ACCOUNTS of the number of Cottages erected, and of the quantity of Land apportioned to each, to be delivered to the Society, with proper CERTIFICATES, on or before the first Tuesday in February, 1801.

141. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in February, 1802.

142. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be delivered on or before the first Tuesday in February, 1803.

Premiums for Discoveries and Improvements in Chemistry, Dying, and Mineralogy.

143. BARILLA. For the greatest quantity of Merchantable Barilla, not less than half a ton, made from Spanish Kali, or any other plant raised in Great Britain; the GOLD MEDAL, or THIRTY GUINEAS.

A sample, of not less than twenty-eight pounds, with a CERTIFICATE that half a ton has been made, to be produced on or before the first Tuesday in January, 1801.

144. PRESERVING SEEDS OF VEGETABLES. For the best method of preserving the Seeds of Plants, in a state fit for vegetation, a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial; to be communicated to the Society on or before the first Tuesday in December, 1800; the GOLD MEDAL, or THIRTY GUINEAS.

145. The same premium is extended one year further; the ACCOUNTS to be produced on or before the first Tuesday in December, 1801.

146. METHOD OF SEPARATING THE SACCHARINE SUBSTANCE OF TREACLE IN A SOLID FORM. To the person who shall discover to the Society the best method of separating the Saccharine Substance of Treacle in a solid form, at such an expence as will

will render it advantageous to the public; the GOLD MEDAL, or FIFTY GUINEAS.

A quantity of the Saccharine Substance, so separated, in a solid form, not less than thirty pounds weight, with an account of the process, and CERTIFICATES that not less than one hundred weight has been prepared, to be produced to the Society on or before the first Tuesday in February, 1801.

147. PRESERVING FRESH-WATER SWEET. To the person who shall produce to the Society the best account, verified by satisfactory trials, of an efficacious method of preserving Fresh-Water sweet during long Voyages; the GOLD MEDAL, or FIFTY GUINEAS.

ACCOUNTS, and full descriptions of the methods made use of, in order that it may be known that nothing injurious enters therein, to be produced to the Society, with at least thirty gallons of Water so preserved, and proper CERTIFICATES, on or before the last Tuesday in December, 1800.

148. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the last Tuesday in December, 1801.

149. PURIFYING BRACKISH OR CORRUPTED WATER. To the person who shall discover to the Society the best and cheapest method, verified by actual experiment, of Purifying or reducing Brackish or Corrupted Water, so as to be fit for the use of families, and for the purpose of cattle; the SILVER MEDAL, or FIFTEEN GUINEAS.

Satisfactory CERTIFICATES that such Brackish Water has been rendered perfectly sweet, and used by some family for domestic purposes, during at least three months, with an account of the method employed in purifying the same, to be delivered to the Society on or before the second Tuesday in February, 1801.

150. DESTROYING SMOKE. For the best account, ascertained by proper experiments, of a cheap method of burning the Smoke of Fires belonging to Steam-Engines, Furnaces employed in calcining or smelting Metals, or other large works, in order to prevent annoyance to the neighbourhood; to be produced on or before the first Tuesday in January, 1801; the GOLD MEDAL, or THIRTY GUINEAS.

151. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the first Tuesday in January, 1802.

152. CONDENSING SMOKE. To the person who shall invent the best method by which the Smoke of Steam-Engines, Brewhouses, Sugar-houses, or Furnaces, may be advantageously condensed and collected in the form of Tar, or some other useful material; the GOLD MEDAL, or FIFTY GUINEAS.

The ACCOUNTS, with proper CERTIFICATES of the method having been successfully employed, and specimens of the materials produced, to be delivered to the Society on or before the first Tuesday in December, 1800.

153. The same premium is extended one year further.

The

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in December, 1801.

154. CANDLES FROM RESIN OR OTHER SUBSTANCE. To the person who shall discover to the Society the best method of making Candles of Resin, or any other substance, fit for common use, at a price much inferior to those made of Tallow only; the GOLD MEDAL, or THIRTY GUINEAS.

Six pounds at least of the Candles so prepared, with an ACCOUNT of the process, to be delivered to the Society on or before the first Tuesday in December, 1800.

155. REFINING WHALE OR SEAL OIL. For disclosing to the Society an effectual method of purifying Whale or Seal Oil from the glutinous matter that encrusts the wicks of lamps and extinguishes the light, though fully supplied with oil; the GOLD MEDAL, or FIFTY GUINEAS.

It is required that the whole of the process be fully and fairly disclosed, in order that satisfactory experiments may be made by the Society to determine the validity of the claim; and CERTIFICATES that not less than twenty gallons have been purified according to the process delivered in, together with two gallons of the oil, in its unpurified state, and two gallons so refined, be produced to the Society on or before the second Tuesday in February, 1801.

156. The same premium is extended one year further.

CERTIFICATES and SAMPLES to be produced on or before the second Tuesday in February, 1802.

157. CLEARING FEATHERS FROM THEIR ANIMAL OIL. To the person who shall discover to the Society the best and most expeditious method, superior to any hitherto practised, of clearing Goose-feathers from their offensive Animal Oil, for the use of Upholders, in making beds, cushions, &c. the GOLD MEDAL, or FORTY GUINEAS.

A quantity of such Feathers, unstripped, and so cleared, not less than forty pounds weight, with a full account of the process, to be produced to the Society on or before the first Tuesday in February, 1801.

158. SUBSTITUTE FOR, OR PREPARATION OF, YEAST. For discovering to the Society an effectual Substitute for Yeast, or preparation of Yeast, which, after being kept six months, shall be fit for fermenting liquors, and raising bread; the GOLD MEDAL, or THIRTY GUINEAS.

Specimens of the Substitute, or of the Preparation of Yeast, sufficient for trials, together with a paper sealed up, and containing an account of the composition of the Substitute, or method of preparing the Yeast, to be produced on or before the last Tuesday in November, 1800.

159. PROOF SPIRIT. To the Distiller who, in the year 1800, shall make the greatest quantity, not less than one hundred gallons, of a clean marketable Spirit, from articles not the food of man or cattle, equal in strength or quality to the Proof Spirit now in use, and at a rate not higher than the spirit produced from corn or melasses; the GOLD MEDAL, or FIFTY GUINEAS.

Ten

Ten gallons of the Spirit, together with proper CERTIFICATES, and a full account of the expence and mode of making it, to be produced to the Society on or before the first Tuesday in January, 1801.

160. PRESERVING SALTED PROVISIONS FROM BECOMING RANCID OR RUSTY. To the person who shall discover to the Society the best, cheapest, and most efficacious method of preserving Salted Provisions from growing rancid or rusty; the GOLD MEDAL, or THIRTY GUINEAS.

A full description of the method, with proper CERTIFICATES that it has been found, on repeated trials, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1801.

161. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced to the Society on or before the first Tuesday in February, 1802.

162. INCREASING STEAM. To the person who shall invent and discover to the Society a method, verified by actual experiments, of increasing the quantity or the force of Steam, in Steam-Engines, with less fuel than has hitherto been employed, provided that in general the whole amount of the expences, in using Steam-Engines, may be considerably lessened; the GOLD MEDAL, or THIRTY GUINEAS.

To be communicated to the Society on or before the first Tuesday in January, 1801.

163. PREVENTING THE DRY-ROT IN TIMBER. To the person who shall discover to the Society the cause of the Dry-Rot in Timber, and disclose a certain method of prevention, superior to any hitherto known; the GOLD MEDAL, or THIRTY GUINEAS.

The ACCOUNTS of the cause, and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the second Tuesday in December, 1800.

164. The same premium is extended one year further.

The ACCOUNTS to be produced on or before the second Tuesday in December, 1801.

165. FINE BAR-IRON. To the person, in Great Britain, who shall make the greatest quantity of Bar-Iron, not less than ten tons, with Coak, from Coak Pigs, equal in quality to the best Iron imported from Sweden or Russia, and as fit for converting into Steel; the GOLD MEDAL.

SAMPLES, not less than one hundred weight, with CERTIFICATES that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1801.

166. METHOD OF PREPARING WHITE LEAD, WHICH SHALL NOT BE PREJUDICIAL. To the person who shall discover to the Society a method of preparing White Lead, in a manner that shall not be prejudicial to the health of the Workmen employed either in making or using it, and will answer all the purposes for which White Lead is at present used; the GOLD MEDAL, or FIFTY GUINEAS.

A quan-

A quantity of the White Lead so prepared, with an account of the process made use of, and CERTIFICATES that not less than one ton has been manufactured in the same manner, to be produced to the Society on or before the second Tuesday in February, 1801.

167. SUBSTITUTE FOR THE BASIS OF PAINT. To the person who shall produce to the Society the best Substitute, superior to any hitherto known, for the Basis of Paint, equally proper for the purpose as the White Lead now employed; such Substitute not to be of a noxious quality, and which may be afforded at a price not materially higher than that of White Lead; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

A quantity of the Substitute, not less than fifty pounds weight, with an ACCOUNT of the process used in preparing it, and CERTIFICATES that at least one hundred weight has been manufactured, to be produced to the Society on or before the second Tuesday in November, 1800.

168. The same premium is extended one year further.

CERTIFICATES and ACCOUNTS to be produced on or before the second Tuesday in November, 1801.

169. RED PIGMENT. To the person who shall discover to the Society a full and satisfactory process for preparing a Red Pigment, fit for use, in oil or water, equal in tone and brilliancy to the best Carmines and Lakes, now known or in use, and perfectly durable; the GOLD MEDAL, or THIRTY GUINEAS.

One

One pound weight of such Colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1801.

N. B. It is not required that the Colour so to be produced should resist the action of fire or chemical applications, but remain unaltered by the common exposure to strong light, damps, and noisome vapours.

170. REFINING BLOCK TIN. To the person who shall discover to the Society the best method of purifying or refining *Block Tin*, in such a manner as to render it fit for the finer purposes to which *Grain Tin* is now solely applied, and at an expence that shall not render it higher in price than *Grain Tin*; the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES that not less than three tons have been refined or purified, with a full detail of the process, and a quantity, not less than one hundred weight, of the Tin so refined, to be produced to the Society on or before the first Tuesday in November, 1800.

171. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in November, 1801.

172. GLAZING EARTHEN WARE WITHOUT LEAD. To the person who shall discover to the Society the cheapest, safest, most durable, and most easily fusible Composition, fit for the purpose of glazing the ordinary kinds of Earthen Ware, without any preparation of Lead, and equal to any hitherto in use; the GOLD MEDAL, or THIRTY GUINEAS.

SPE-

SPECIMENS of the Ware so glazed, with proper CERTIFICATES of its having succeeded, and a SAMPLE of the materials made use of, to be produced to the Society on or before the first Tuesday in February, 1801.

173. PRESERVING IRON FROM RUST. To the person who shall invent and discover to the Society, a cheap Composition, superior to any now in use, which shall effectually preserve Wrought Iron from Rust, the GOLD MEDAL, or FIFTY GUINEAS.

A full description of the method of preparing the Composition, with CERTIFICATES that it has stood at least two years unimpaired, and exposed to the atmosphere during the whole time, to be produced to the Society, with ten pounds weight of the composition, on or before the first Tuesday in January, 1801.

174. The same premium is extended one year further.

The description and CERTIFICATES to be produced to the Society on or before the first Tuesday in January, 1802.

175. The same premium is extended one year further.

The description and CERTIFICATES to be produced to the Society on or before the last Tuesday in January, 1803.

176. OPIUM. To the person who, in the year 1800, shall prepare the greatest quantity, not less than twenty pounds weight, of Opium, from Poppies grown in Great Britain, and equal in quality to the best foreign Opium; the GOLD MEDAL, or FIFTY GUINEAS.

177.

177. For the next greatest quantity, not less than ten pounds weight, the SILVER MEDAL, or TWENTY GUINEAS.

SAMPLES of the Opium, not less than five pounds weight, with proper CERTIFICATES that the whole is of the same quality, to be produced to the Society, with a particular account of the method of cultivating the Poppies, and preparing the Opium, on or before the last Tuesday in February, 1801.

178. SUBSTITUTE FOR TAR. To the person who shall invent and discover to the Society the best Substitute for Vegetable Tar, equal in all its properties to the best Sockholm Tar, and prepared from materials the produce of Great-Britain; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

A quantity of the Substitsute, not less than one hundred weight, with CERTIFICATES that at least one ton has been manufactured, and that it can be afforded at a price not exceeding that of the best foreign Tar, together with an Account of the process, to be delivered to the Society on or before the first Tuesday in March, 1801.

179. The same premium is extended one year further.

The SAMPLES, CERTIFICATES, and ACCOUNTS, to be delivered to the Society on or before the first Tuesday in March, 1802.

Premiums for promoting the Polite Arts.

180. HONORARY PREMIUMS FOR DRAWING. For the best Drawing of any kind, made with Water-Colours, Crayons, Chalk, Black Lead, Pen, Indian Ink, or Bister, by young Gentlemen under the age of twenty-one, sons or grandsons of Peers, or Peeresses in their own right, of Great Britain or Ireland, to be produced on or before the first Tuesday in March, 1801, the HONORARY MEDAL of the Society IN GOLD.

131. The same IN SILVER for the next in merit.

182, 183. The same premiums will be given, on the like conditions, to young Ladies, daughters or granddaughters of Peers, or Peeresses in their own right, of Great Britain or Ireland.

184. HONORARY PREMIUMS FOR DRAWINGS. For the best Drawing of any kind, made with Water-Colours, Crayons, Chalk, Black Lead, Pen, Indian Ink, or Bister, by young Gentlemen under the age of twenty-one; to be produced on or before the first Tuesday in March, 1801; the GOLD MEDAL.

185. For the next in merit, the SILVER MEDAL.

186, 187. The same premiums will be given for Drawings by young Ladies.

N. B. As the foregoing Honorary Premiums are intended only for such of the Nobility and Gentry as may hereafter become patrons or patronesses of the Arts; persons

sons professing any branch of the Polite Arts, or any business dependent on the Arts of Design, or the sons or daughters of such persons, will not be admitted Candidates in these Classes.

The following Premium (Class 188) *is offered in conformity to the Will of the late John Stock, of Hampstead, Esq.*

188. SCULPTURE. For the best Basso-relievo in Terra Cotta, the subject taken from the Iliad of Homer, and consisting of not fewer than three human figures, the height of the principal figure not less than twelve inches, to be produced on or before the third Tuesday in February, 1801, a SILVER MEDALLION, with the following engraved inscription: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampstead, Esq.*

The Basso-relievo to which the premium is adjudged, to remain the property of the Society.

189. DRAWINGS OF OUTLINES. For the best Outline, after an original group or cast, in plaster, of Human Figures, by persons of either sex, under the age of sixteen, the principal figure not less than twelve inches; to be produced on or before the third Tuesday in February, 1801; the greater SILVER PALLET.

190. For the next in merit, the lesser SILVER PALLET.

N. B. These Drawings are to be made on Paper; and the original either to be produced to the Society, or to be referred to for their examination.

191. DRAWINGS OF LANDSCAPES. For the best Drawing of a Landscape after nature, by persons of either

either sex, under twenty-one years of age, to be produced on before the third Tuesday in February, 1801, the greater SILVER PALLET.

192. For the next in merit, the lesser SILVER PALLET.

Each Candidate must mention, on the front of the Drawing, from whence the View was taken; and the Drawings must be made with Chalk, Pen, Indian Ink, Water-Colours, or Bister.

193. HISTORICAL DRAWINGS. For the best Historical Drawing, being an original composition, of five or more Human Figures; the height of the principal figure not less than eight inches; to be made with Crayons, Chalk, Black Lead, Pen, Indian Ink, Water-Colours, or Bister, and to be produced on or before the third Tuesday in February, 1801; the GOLD PALLET.

194. For the next in merit, the greater SILVER PALLET.

195. SURVEYS OF COUNTIES. To the person who, in the year 1800, shall complete and publish an accurate Survey of any one County in England or Wales, on a scale of not less than one inch to a mile, for which rewards have not already been given by the Society; the GOLD MEDAL, or FIFTY GUINEAS.

CERTIFICATES of the accuracy of the Survey, and that it was begun after the first of June, 1796, together with the Map, to be produced on or before the first Tuesday in January, 1801.

The Map to which the premium shall be adjudged, to remain the property of the Society.

N. B.

N.B. The Society are already in possession of Surveys of the following Counties, viz. Bedford, Cheshire, Cornwall, Cumberland, Derbyshire, Devonshire, Dorsetshire, Durham, Hampshire, Herefordshire, Hertfordshire, Huntingdonshire, Lancashire, Leicestershire, Northamptonshire, North Wales (large and small), Nottinghamshire, Oxfordshire, Somersetshire, Staffordshire, Suffolk, Surrey, Sussex, Westmoreland, and Worcestershire.

197. The same premium is extended one year further.

The Survey to be begun after the first of June, 1797; and the Map to be produced on or before the last Tuesday in January, 1802.

198. NATURAL HISTORY. To the Author who shall publish, in the year 1800, the Natural History of any County in England or Wales, the GOLD MEDAL, or FIFTY GUINEAS.

It is required that the several natural productions, whether animal, vegetable, or mineral, peculiar to the County, or found therein, be carefully and specifically arranged and described, in order that the Public may be enabled to judge what Arts or Manufactures are most likely to succeed in such County.

The Work to be delivered to the Society on or before the last Tuesday in January, 1801.

199. The same premium is extended one year further.

The Work to be delivered to the Society on or before the last Tuesday in January, 1802.

200.

200. The same premium is extended one year further.

The Work to be delivered to the Society on or before the first Tuesday in January, 1803.

CONDITIONS.

No person who has gained the first Premium in any Class, will be admitted a Candidate in a Class of an inferior age; and no Candidate shall receive more than one Premium in one year; nor will they who for two successive years shall gain the first Premium in one Class, be ever again admitted as Candidates in that Class.

No person shall ever be admitted a Candidate in any Class, in which he has three times obtained the whole of the first Premium.

No Candidate shall send in more than one Performance in any one Class.

All the Claims which are produced each Session before the Committee of Polite Arts (to which Premiums or Bounties are adjudged), are to remain with the Society till after the public distribution of Rewards in May.

No Claim for a Premium in the Polite Arts will be admitted, that has obtained, or has been produced in order to obtain, a Premium, Reward, or Gratification, from any other Society, or any Academy or School.

All Performances that obtain Premiums in the Polite Arts, must be begun after the publication of such Premiums.

Purposely to encourage real merit, and to prevent any attempts to impose on the Society, by producing drawings which shall have been made or retouched by any other person than the Candidate, the Society is resolved, upon all occasions, with respect to the successful Candidates in

Classes 190 to 194 inclusive, to prove their abilities, by requiring a specimen made under the inspection of the Committee of Polite Arts, in every instance where such proof can be obtained.

It is required that all Candidates in the Polite Arts do signify, on their Drawings, their age; and whether the performances are originals, or copies; and, if copies, whence they were taken.

Premiums for encouraging and improving Manufactures.

201. SILK. For the greatest quantity of merchantable Silk, not less than ten pounds weight, produced by Worms bred in England in the year 1800, the property of any one person; the GOLD MEDAL.

202. For the second greatest quantity, not less than five pounds weight, the SILVER MEDAL.

SPECIMENS of the SILK, not less than one pound, with CERTIFICATES that the whole is of equal quality, and produced in England, to be delivered to the Society on or before the first Tuesday in January, 1801.

203. MACHINE FOR CARDING SILK. For the best Machine, superior to any now in use, for carding Waste Silk equally well as by hand; to be produced, together with a specimen of the Cardings, on or before the first Tuesday in November, 1800; the SILVER MEDAL, or TWENTY GUINEAS.

204. CLOTH FROM HOP-STALKS OR BINES. To the person who shall produce to the Society the greatest quantity, not less than thirty yards, of Cloth, at least twenty-seven inches wide, made in Great Britain, of Hop-Stalks or Bines, and much finer in quality than any hitherto manufactured in England of that material; the GOLD MEDAL, or THIRTY GUINEAS.

One pound of the Thread of which the Cloth is made, and thirty yards of the Cloth, together with proper CER-

TIFICATES that the whole is manufactured from Hop-Stalks or Bines, to be produced to the Society on or before the first Tuesday in December, 1800.

N. B. The Society are already in possession of Cloth made in England from Hop-Stalks or Bines, which may be inspected by application to the Register.

205. WICKS FOR CANDLES OR LAMPS. To the person who shall discover to the Society a method of manufacturing Hop-Stalks or Bines, or any other cheap material, the growth of Great Britain, so as to render them fit for the purpose of supplying the place of Cotton, for Wicks of Candles or Lamps; TWENTY GUINEAS.

SAMPLES, not less than five pounds weight, of the Wicks, so prepared, to be produced to the Society, with CERTIFICATES that the whole quantity is equal in quality to the Sample, on or before the second Tuesday in January, 1801.

206. The same premium is extended one year further.

SAMPLES and CERTIFICATES to be produced on or before the second Tuesday in January, 1802.

207. PAPER FROM RAW VEGETABLE SUBSTANCES. To the person in Great Britain who shall make the greatest quantity, not less than ten reams, of the best and most useful Paper, from Raw Vegetable Substances, superior to any hitherto manufactured from such substances; TWENTY GUINEAS.

CERTIFICATES of the making such Paper, and one ream of the Paper, to be produced on or before the first Tuesday in November, 1800.

N. B.

N. B. The Society are in possession of two volumes, containing a great variety of Specimens of Paper made from Raw Vegetables, viz. Thistles, Potatoe-Haum, Poplar, Hop-bines, &c. which volumes may be inspected by any person, on application to the Register.

208. TAKING PORPOISES. To the people in any boat or vessel, who, in the year 1800, shall take the greatest number of Porpoises, on the coast of Great Britain, by Gun-Harpoon, or any other method, not fewer than thirty, for the purpose of extracting oil from them; THIRTY POUNDS.

CERTIFICATES of the number, signed by the persons to whom they have been sold or delivered for the purpose of extracting the oil, to be produced to the Society on or before the last Tuesday in January, 1801.

209. OIL FROM PORPOISES. To the person who shall manufacture the greatest quantity of Oil from Porpoises taken on the coast of Great Britain, in the year 1800, not less than thirty tons; THIRTY POUNDS.

210. For the next greatest quantity, not less than fifteen tons, FIFTEEN POUNDS.

CERTIFICATES of the Oil having been made from Porpoises actually caught on the coast of Great Britain, and two gallons of the Oil, as a Sample, to be produced to the Society on or before the last Tuesday in February, 1801.

Premiums for Inventions in Mechanicks.

211. TRANSIT INSTRUMENT. To the person who shall invent and produce to the Society a cheap and portable Transit Instrument, which may easily be converted into a Zenith Sector, capable of being accurately and expeditiously adjusted for the purpose of finding the Latitudes and Longitudes of places, and superior to any portable Transit Instrument now in use; the GOLD MEDAL, or FORTY GUINEAS.

To be produced on or before the last Tuesday in January, 1801.

212. TAKING WHALES BY THE GUN-HARPOON. To the person who, in the year 1800, shall strike the greatest number of Whales, not fewer than three, with the Gun-Harpoon; TEN GUINEAS.

Proper CERTIFICATES of the striking such Whales, and that they were actually taken in the year 1800, signed by the Master, or by the Mate when the Claim is made by the Master, to be produced to the Society on or before the last Tuesday in December, 1800.

213. DRIVING BOLTS INTO SHIPS. To the person who shall invent and produce to the Society a Model, shewing a method of driving Bolts into Ships, particularly those of Copper, without splitting the head or bending them, with more dispatch, in all directions, and tighter than by any means hitherto known or in use; the GOLD MEDAL, or FORTY GUINEAS.

The

The Model, with CERTIFICATES that a Machine on the same construction has been used to advantage, to be produced to the Society on or before the first Tuesday in February, 1801.

214. PARISH OR FAMILY MILL. To the person who shall invent and produce to the Society, the best constructed Mill for grinding Corn for the use of private families, or parish poor; the construction to be such as to render the working of the Mill easy and expeditious, and superior to any hitherto in use; the GOLD MEDAL, or FORTY GUINEAS.

The Mill, and CERTIFICATES of its having been used to good effect, to be produced to the Society on or before the first Tuesday in February, 1801.

N. B. Cheapness and simplicity will be considered as essential parts of its merit; and the Mill, or the Model, to remain with the Society.

215. MACHINE FOR RAISING COALS, ORE, &c. &c. To the person who shall invent a Machine for raising Coals, Ore, &c. from Mines, superior to any hitherto known or in use, and which shall produce the effect at a less expence than those already known or in use; the GOLD MEDAL, or FIFTY GUINEAS.

A Model of the Machine, made on a scale of not less than one inch to a foot, with a CERTIFICATE that a Machine at large on the same construction has been advantageously used, to be produced to the Society on or before the second Tuesday in February, 1801.

216. MACHINE FOR RAISING WATER. To the person who shall invent a Machine, on a better,

cheaper, and more simple construction than any hitherto known or in use, for raising Water out of Wells, &c. from a depth not less than fifty feet; the GOLD MEDAL, or FORTY GUINEAS.

CERTIFICATES of the performance of the Machine, and a Model of it, on a scale of not less than one inch to a foot, to be produced to the Society on or before the first Tuesday in February, 1801.

217. MACHINE FOR MAKING BRICKS. To the person who shall invent the best and cheapest Machine for making Bricks, superior to any hitherto known or in use, whereby the labour and expence of making Bricks in the usual mode, by hand, may be greatly diminished; FORTY GUINEAS.

A Model, with CERTIFICATES that a Machine at large, on the same construction, has been used to good effect for the purpose of making Bricks, and that at least one hundred thousand Statute Bricks have been made therewith, to be produced to the Society on or before the first Tuesday in March, 1801.

218. BORING ROCKS IN ORDER TO BLAST THEM. To the person who shall discover to the Society a more cheap, simple, and expeditious Method than any hitherto known or in use, of Boring Rocks in Mines, Shafts, Wells, &c. for the purpose of Blasting them with Gunpowder; the GOLD MEDAL, or FORTY GUINEAS.

CERTIFICATES of the Method having been practised with success, with a full description thereof, to be delivered to the Society on before the first Tuesday in January, 1801.

*218. CLEANSING CHIMNEYS. To the person who shall invent and produce to the Society the most simple, cheap, and proper apparatus, superior to any hitherto known or in use, for cleansing Chimneys from Soot, and obviating the necessity of children being employed within the flues, in the manner now practised; the GOLD MEDAL, or FORTY GUINEAS.

The Apparatus, with CERTIFICATES of its having been used with proper effect, to be produced to the Society on or before the third Tuesday in February, 1800.

219. PREVENTING PASSENGERS IN CARRIAGES BEING INJURED WHEN THE HORSES HAVE TAKEN FRIGHT. To the person who shall invent and discover to the Society the best and most effectual method of preventing Passengers in Carriages being injured when the Horses have taken fright; the GOLD MEDAL, or THIRTY GUINEAS.

CERTIFICATES that the Invention has been usefully applied to at least one Carriage, and may be advantageously applied to others, to be produced to the Society on or before the second Tuesday in February, 1801.

220. GUNPOWDER MILLS. To the person who, in the year 1800, shall invent and bring to perfection the most effectual method of so conducting the works of Gunpowder Mills, in the business of making Gunpowder, as to prevent explosion; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

CERTIFICATES and ACCOUNTS of the method having been put in practice in one or more Gunpowder Mills in this

this kingdom, and that it promises, in the opinion of the best judges concerned in such works, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1801.

221. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in February, 1802.

N. B. As an encouragement to persons to turn their thoughts to improvements of this nature, if any should be made on the present method of conducting the business of Gunpowder-making, which fall short of the total prevention of explosion, and they are sent to the Society, for the sake of humanity, the Papers so sent in will receive due consideration, and such Bounty or Reward will be bestowed thereon as they appear to merit.

222. MILL STONES. To the person who shall discover, in Great Britain, a Quarry of Stone fit for the purposes of Mill Stones, for grinding Wheat, and equal in all respects to that Stone known by the name of FRENCH BURR; the GOLD MEDAL, or ONE HUNDRED POUNDS.

A pair of Mill Stones, at least three feet eight inches diameter, with an account of the situation of the Quarry, and CERTIFICATES that not fewer than two pair of such Mill Stones have been effectually used for grinding Wheat, to be produced to the Society on or before the first Tuesday in February, 1801.

223. The same premium is extended one year further.

The ACCOUNTS, SAMPLES, and CERTIFICATES to be produced to the Society on or before the first Tuesday in February, 1802.

224.

224. HEATING ROOMS FOR THE PURPOSES OF MANUFACTURERS. To the person who shall invent and discover to the Society a Method of Heating Rooms, superior to any hitherto known or in use, and at a moderate expence, for the purposes of Painters, Japanners, and other Manufacturers, so as to avoid the necessity of iron or copper tunnels going through the rooms to convey the smoke, whereby the danger from such tunnels may be prevented; the GOLD MEDAL, or FORTY GUINEAS.

A Model, or complete Drawing and Description of the Method, with CERTIFICATES that is has been successfully practised, to be delivered to the Society on or before the last Tuesday in March, 1801.

Premiums offered for the advantage of the British Colonies.

225. NUTMEGS, For the greates quantity of merchantable Nutmegs, not less than ten pounds weight, being the growth of his Majesty's dominions in the West Indies, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, and equal to those imported from the Islands of the East Indies; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

Satisfactory CERTIFICATES, from the Governor or Commander in Chief, of the place of growth, with an account of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the first Tuesday in December, 1800.

226. The same premium is extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in December, 1801.

227. CINNAMON. For importing into the port of London, in the year 1800, the greatest quantity, not less than twenty pounds weight, of Cinnamon, being the growth of some of the Islands in the West Indies belonging to the Crown of Great Britain, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, and equal in goodness to the Cinnamon brought from the East Indies; the GOLD MEDAL, or FIFTY GUINEAS.

SAMPLES, not less than two pounds weight, with CERTIFICATES that the whole quantity is equal in goodness;

ness; together with satisfactory CERTIFICATES, signed by the Governor, or Commander in Chief, of the place of growth, with an account of the number of trees growing on the spot, their age, and the manner of culture; to be produced to the Society on or before the first Tuesday in January, 1801.

228. CLOVES. For importing into the port of London, in the year 1800, the greatest quantity of Cloves, not less than twenty pounds weight, being of the growth of some of the Islands of the West Indiess subject to the Crown of Great Britain, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, and equal in goodness to the Cloves brought from the East Indies; the GOLD MEDAL, or FIFTY GUINEAS.

SAMPLES, not less than two pounds weight, with CERTIFICATES that the whole quantity is equal in goodness, together with satisfactory CERTIFICATES, signed by the Governor, or Commander in Chief, of the place of growth, with an account of the number of trees growing on the spot, their age, and the manner of culture, to be produced to the Society on or before the first Tuesday in January, 1801.

229. The same premium is extended one year further.

SAMPLES and CERTIFICATES to be produced on or before the first Tuesday in January, 1802.

230. PLANTATIONS OF BREAD-FRUIT TREES. To the person who shall have raised in any of the Islands of the West Indies, subject to the Crown of Great Britain, or in any of the British Settlements on the Coast of Africa,

Africa, or the several Islands adjacent thereto, between the first of January, 1799, and the first of January, 1800, the greatest number of Bread-fruit Trees, not fewer than one hundred, and properly fenced and secured the same, in order to supply the Fruit to the Inhabitants; the GOLD MEDAL, or THIRTY GUINEAS.

Proper ACCOUNTS and CERTIFICATES, signed by the Governor, or Commander in Chief, of the methods made use of in cultivating the Plants and securing the Plantation, and that the Trees are in a growing and thriving state at the time of signing such Certificates, to be produced to the Society, with Samples of the Fruit, on or before the first Tuesday in January, 1801.

231. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in January, 1802.

232. The same premium is extended one year further.

The ACCOUNTS and CERTIFICATES to be produced on or before the first Tuesday in January, 1803.

233. KALI FOR BARILLA. To the person who shall have cultivated, in the Bahama Islands, or any other part of his Majesty's dominions in the West Indies, or any of the British Settlements on the Coast of Africa, or the several Islands adjacent thereto, in the year 1797, the greatest quantity of land, not less than two acres, with Spanish Kali, fit for the purpose of making Barilla; the GOLD MEDAL, or THIRTY GUINEAS.

234. For the next greatest quantity, not less than one acre, the SILVER MEDAL, or FIFTEEN GUINEAS.

CER-

CERTIFICATES, signed by the Governor, or Commander in Chief for the time being, of the quantity of land so cultivated, and of the state of the Plants at the time of signing such Certificates, to be delivered to the Society, with Samples of the Kali, on or before the second Tuesday in November, 1800.

235, 236. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in November, 1801.

237, 238. The same premiums are extended one year further.

CERTIFICATES to be produced on or before the second Tuesday in November, 1802

239. DESTROYING THE INSECT COMMONLY CALLED THE BORER. To the person who shall discover to the Society an effectual method of destroying the Insect commonly called the BORER, which has of late years been so destructive to the Sugar-Canes in the West-India Islands, the British Settlements on the Coast of Africa, and the several Islands adjacent thereto; the GOLD MEDAL, or FIFTY GUINEAS.

The Discovery to be ascertained by satisfactory CERTIFICATES, under the hand and seal of the Governor, or Commander in Chief for the time being, and of some other respectable persons, inhabitants of the Islands, or other place, in which the remedy has been successfully applied; such CERTIFICATES to be delivered to the Society on or before the first Tuesday in January, 1801.

240.

240. The same premium is extended one year further.

CERTIFICATES to be delivered on or before the first Tuesday in January, 1802.

241. BOTANIC GARDEN IN THE BAHAMA ISLANDS. To the person who, before the first of January, 1800, shall have set apart, and, at his own private expence, shall have properly fenced and cultivated, the greatest quantity of ground, not less than five acres, in any of the Bahama Islands, as a Botanic Garden, for the purpose of making experiments in the culture of those articles which are the peculiar production of the tropical climates, and which may tend to promote the commerce and manufactures of this country; the GOLD MEDAL, or ONE HUNDRED GUINEAS.

It is required that any person claiming the foregoing premium should produce to the Society, on or before the first Tuesday in January, 1801, a CERTIFICATE from the Governor, or Commander in Chief of the Bahama Islands for the time being, of his having complied with the above requisitions, and that the Garden is in a proper state of culture at the time of signing such Certificate.

Premiums offered for the advantage of the British Settlements in the East Indies.

242. BHAUGULPORE COTTON. To the person who shall import into the port of London, in the year 1800, the greatest quantity, not less than one ton, of the Bhaugulpore Cotton, from which clothes are made in imitation of Nankeen, without dying; the GOLD MEDAL.

A quantity of the Cotton, not less than five pounds weight in the pod, and five pounds carded, to be produced to the Society, with proper CERTIFICATES, signed by the Secretary to the Board of Trade of Bengal or Bombay, on or before the last Tuesday in February, 1801.

243. The same premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced to the Society on or before the last Tuesday in February, 1802.

244. The same premium is extended one year further.

The SAMPLES and CERTIFICATES to be produced to the Society or or before the last Tuesday in February, 1803.

245. ANNATTO. To the person who, in the year 1800, shall import into the port of London, from any part of the British Settlements in the East Indies, the greatest quantity of Annatto, not less than five hundred weight; the GOLD MEDAL.

GENERAL CONDITIONS.

NOTWITHSTANDING the Society reserve to themselves the power of giving, in all cases, such part only of any Premium as the performance shall be adjudged to deserve, or of withholding the whole, if there be no merit; yet the Candidates may be assured the Society will always judge liberally of their several Claims.

IT is required that the matters for which Premiums are offered, be delivered in without names, or any intimation to whom they belong; that each particular thing be marked in what manner each Claimant thinks fit, such Claimant sending with it a paper sealed up, having on the outside a corresponding mark, and on the inside the Claimant's name and address: and all Candidates are to take notice, that no Claim for a Premium will be attended to, unless the conditions of the Advertisement are fully complied with.

No Papers shall be opened, but such as shall gain Premiums, unless where it appears to the Society absolutely necessary for the determination of the Claim; all the rest shall be returned unopened, with the Matters to which they belong, if enquired after by the Mark, within two years; after which time, if not demanded, they shall be publicly burnt, unopened, at some meeting of the Society.

All Models of Machines, which obtain Premiums or Bounties, shall be the property of the Society; and where a Premium or Bounty is given for any Machine, a perfect Model thereof shall be given to the Society.

All the Premiums of this Society are designed for Great Britain, unless expressly mentioned to the contrary.

The

The Claims shall be determined as soon as possible after the delivery of the specimens.

No person shall receive any Premium, Bounty, or Encouragement from the Society, for any matter for which he has obtained, or purposes to obtain, a patent.

A Candidate for a Premium, or a person applying for a Bounty, being detected in any disingenuous method to impose on the Society, shall forfeit such Bounty, and be deemed incapable of obtaining any for the future.

The Performances which each year obtain Premiums or Bounties are to remain with the Society until after the public distribution of Rewards.

No member of this Society shall be a Candidate for, or entitled to receive, any Premium, Bounty, or Reward whatsoever, except the Honorary Medal of the Society.

Where Certificates are required to be produced in claim of Premiums, they should be expressed, as nearly as possible, in the words of the respective advertisements, and should not be from the Candidate (solely), but from some other person or persons who have a positive knowledge of the facts certified.

Where Premiums or Bounties are obtained in consequence of specimens produced, the Society mean to retain such part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No Candidates shall be present at any meetings of the Society or Committees, or admitted at the Society's Rooms, after they have delivered in their Claims, until such Claims are adjudged, unless summoned by the Committee.

N. B. Any information or advice that may forward the designs of this Society for the public good, will be received thankfully, and duly considered, if communicated

by letter, addressed to the Society, and directed to Mr. CHARLES TAYLOR, the Secretary, at the Society's Office, in the Adelphi Buildings, London.

As the Acres of different Districts vary in extent, it is necessary to observe, that the Society mean Statute Acres, of five and a half yards to the rod or pole, when acres are mentioned in their list of premiums; and they request that all communications to them may be made agreeably thereto. The Society also desire that the Papers on different subjects sent in to them may be full, clear, explicit, and fit for publication.

*** In case any person should be inclined to leave a sum of money to this Society, by will, the following form is offered for that purpose:

Item. I give and bequeath to A. B. and C. D. the sum of upon condition and the intent that they, or one of them, do pay the same to the Collector for the time being of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures and Commerce; which said sum of I will and desire may be paid out of my personal estate, and applied towards the carrying on the laudable designs of the Society.

By Order of the Society,

CHARLES TAYLOR, Secretary.

PAPERS

IN

AGRICULTURE.

AGRICULTURE.

THE GOLD MEDAL, being the Premium offered for planting ACORNS, was this Session adjudged to the Right Honourable the MARQUIS of TITCHFIELD, of Grosvenor-Street, from whom the following Account and Certificate were received.

SIR,

THIS is to certify, That between October 1798, and April 1799, the following pieces of Land were sown with Acorns, viz.

One piece of land, in quantity thirty-four acres, was sown with one thousand and eighty-eight bushels of Acorns, in drills of about twenty-four inches apart; the land was previously prepared by a turnip-fallow, and at the same time that the

the Acorns were sown, it was sown with rye broad-cast, which produced a good crop, and the Oak-plants have a thriving and healthy appearance.

The soil is light sand, with a very small mixture of gravel; part of it had been sown with turnips in 1797; and the remainder, which had been too much cropped, was worn-out grass, very full of weeds. The whole was fallowed in the autumn of that year, and in the summer following was repeatedly ploughed and harrowed; and, in short, put into perfect order for turnips, which were manured with malt combs, at the rate of ten quarters per acre, except where turnips had been sown the year before, and which therefore received a smaller dressing of malt combs. The turnips were hoed only once; they were a tolerable crop, and were begun to be eaten off by sheep in the month of November. As fast as the turnips were eaten, the land was ploughed and harrowed, and rye was

ploughed

ploughed in by a second ploughing. The Acorns were sown at the rate of thirty-two bushels per acre, in every third furrow, and covered by the fourth, and they stood in rows from eighteen to twenty-four inches asunder: the rye did not require weeding; and when reaped, was carried by hand to vacant places, from whence it was carted. The rye stubble is supposed to have been a great protection to the young plants, which have not suffered either by frost or drought.

Another piece of land, in quantity eleven acres, was sown with three hundred and eighty-four bushels of Acorns, broad-cast; the land was previously prepared by ploughing only, and at the same time it was sown with rye, which did not produce a good crop. The Oak-plants have a very healthy appearance. This plantation is situated upon a part of Sherwood Forest lately inclosed, the soil of which is light and gravelly, and has lately

lately been cleared of old Oaks. It was ploughed only once, and sown at the end of October with rye and acorns, at the rate of twenty-four bushels per acre, in the same manner as that before described; but from want of tillage it was left in a very rough state, and the rye was so bad a crop as not to be worth reaping. The Acorns, however, grew as well as could be desired; this year they appear to have suffered from the grub.

A third piece of land, in quantity four acres and a half, was sown with two hundred and eight bushels of Acorns, some in beds of forty-eight inches wide, and furrows in each bed, and some in drills of nine inches and a half apart; the land was previously prepared by trenching. Those sown in beds grow very well, those in drills extremely ill.

This plantation is on a clay soil, with strong patches of gravel: the land was trenched in the years 1797 and 1798 from old

old grass, and was the greatest part sown with acorns at the rate of forty-eight bushels per acre, in beds, which grew perfectly well. Upon a small part of the land, which had been sown as it had been trenched, without being thrown up into beds, the plants do not thrive The sowing of this plantation was begun in October 1798, and was not finished till March 1799.

It was necessary, during the winter and spring succeeding the sowing of the Acorns, to employ persons to frighten away the crows, which otherwise would have thinned the crop very much.

I am, SIR,

Your humble Servant,

ROBERT MEE.

This

THIS is to certify, That the pieces of land sown with Acorns, named in the annexed Paper, were,

First, One piece, upwards of thirty-four acres, situated in the parish of Norton Cuckney, in the county of Nottingham.

Secondly, One piece, upwards of eleven acres, situated in the parish of Sutton in Ashfield, vulgarly called Thieves Wood, in the same county.

Thirdly, A piece of land, in the liberty of Welbeck, upwards of four acres and a half, and in the same county.

The whole were sown by the directions of the Marquis of Titchfield.

ROBERT MEE, Woodman.

THIS is to certify also, That the several Plantations above-mentioned are properly fenced and secured against cattle.

ROBERT MEE, Woodman.
SCOTT TITCHFIELD.

Nov. 1, 1799.

SIR,

YOUR letter of the 31st of January, I last night received; in answer to which I have to assure you, that I did sign a Certificate in November last, by which is shown, that the Marquis of Titchfield had sown forty-nine and a half acres of land between October 1798, and April 1799. In answer to your next question, whether there were at least three hundred young Oaks growing on each acre, I have to inform you, that there is not a single acre, in any of the plantations, but what has many thousands of young Oak-plants growing upon it.

I further beg leave to state to you, as below, how many are counted and growing on two square yards, in each plantation, the situation averaged as near as possible.

In Lord Woodstock's plantation, in Norton, there are, on two square yards, 306 Oak-plants; which, multiplied by

4840

4840 (the square yards in an acre), the product will be 1,481,040, growing on two acres.

In Thieves Wood plantation, at Sutton in Ashfield, there are, on two square yards, 143 Oak-plants; which, multiplied as above, the product will be 692,120, growing on two acres.

In Pope's plantation, in Welbeck, there are, on two square yards, 428 Oak-plants; which, multiplied as before, will be 2,071,520, growing on two acres.

I am, SIR,

Your most obedient Servant,

ROBERT MEE.

Norton,
Feb. 10, 1800.

Mr. TAYLOR.

The

The GOLD MEDAL, being the Premium offered for planting LARCH-TREES, was this Session adjudged to THOMAS JOHNES, M. P. of Hafod, from whom the following Papers were received.

Account of Larch-Trees planted by Thomas Johnes, Esq. of Hafod, in Cardiganshire.

FROM June 1796, to June 1797, four hundred thousand Larches were planted, of which 300,000 were two-years-old seedlings, 85,000 which had been transplanted one year, and 15,000 which had been three years transplanted.

The two-years-old seedling Larches were planted at two feet asunder; those which had been one year transplanted, were planted at two feet and a half, and the others at three to three feet and a half asunder.

I look upon the two-years-old seedling Larches as preferable to any other sizes

for planting high grounds, as the winds make little or no impression upon their tops before their roots get properly fixed in the ground.

The above plantation-grounds were all properly inclosed before any of the trees were planted.

The greatest part of the plantations is fenced with a stone wall, five feet high; the remainder with a turf-fence, the same height, with a dead hedge, and willows planted on the top.

The above plantations are doing extremely well, and the young trees have made good shoots during the last summer.

JAMES TODD, Gardener.

THIS is to certify, That Thomas Johnes, Esq. has planted, on his estate at Hafod, in the county of Cardigan, the above number of trees as already specified; and that I have walked over the plantations with the gardener, and found

found the same in a thriving state, very few of the plants having failed. The plantations are effectually fenced and secured to grow timber; as witness my hand, this 27th day of November, 1799.

LEWIS EVANS,
Minister of Eglwys Newydd.

Mr. TAYLOR.

The GOLD MEDAL, being the Premium offered for planting TIMBER-TREES, was this Session adjudged to the Reverend WILLIAM SMITH, A. M. of Craike, near Easingwold, in the county of York, from whom the following Account and Certificate were received.

SIR,

HAVING, in the years 1796 and 1797, made a plantation of different kinds of Forest-Trees, upon a piece of moor-land, in the township of Flaxton, in the North Riding of the county of York, and which contains eleven acres, I am induced to present to the Society for the Encouragement of Arts, &c. a statement of it, together with the expence, and such remarks as have appeared to me to deserve attention.

Should

Should the Society consider the inclosed as entitled to their Honorary Premium, I shall be highly flattered by such a mark of their approbation.

I remain,

SIR,

Your obedient Servant,

PHILO-DENDRON.

A Statement of the number of Trees planted, and Expence in a Plantation made upon Flaxton-Moor, in the years 1796 and 1797, containing eleven acres.

Names of Trees.	*No. planted Jan. 1796.*	*No. planted Feb. 1797.*	*Total Number.*	*Height when planted.*	*Cost of the Trees.* £.	s.	d.	*Remarks.*
Larch	3000	800	3800	2 feet	9	0	0	Grow well, having made shoots 2 feet this year
Scotch Fir	1000	200	1200	18 in.	1	17	0	Very healthy, and make strong shoots
Birch	1000	200	1200	2 feet	0	14	0	Grow well
Oak	215	1400	1615	2 feet	2	6	0	Healthy, but not luxuriant
Beech	300		300	2½ feet	1	6	0	Grow extremely well
Spruce Fir	200		200	2 feet	0	10	0	Do not appear to answer
Ash	200		200	2 feet	0	5	0	Thrive tolerably
Wych Elm	100	100	200	2 feet	0	16	0	Grow very well
Poplar	200		200	1 foot	0	2	0	Tolerably
Horse Chesnut	100		100	18 in.	0	6	0	Answer very well
Sycamore	200		200	2 feet	0	12	0	Alive, but make no great progress
Common Maple	100		100	2 feet	0	6	0	Only tolerably
Lime	50		50	2 feet	0	3	9	Tolerably
Platinus	50		50	2 feet	0	10	0	Land too cold, but alive
Spanish Chesnut	50		50	2½ feet	0	4	0	Ditto
Alder		100	100	2 feet	0	2	0	Answer very well
Weeping Birch		50	50	2 feet	0	3	6	Ditto
Crabs		50	50	2 feet	0	2	6	Ditto
	6765	2900	9665		19	5	9	

	£.	s.	d.
Quickwood - - - -	1	16	0
Ditching 97 rood, at 10d. per rood -	4	0	10
9665 trees planting, at 1s. 6d. per 100	7	5	0
Hedge cutting, rails, winding with thorns, and other small expences	1	16	0
224 oak-posts, at 6d. each - -	5	12	0
370 rails, at 3½d. each - - -	5	7	11
Total expence - - £.	45	3	6

WE, the Minister, Chapel-Warden, and principal inhabitants of Flaxton, in the North Riding of the county of York, do certify, that we believe the annexed statement to be a true one, and that the trees mentioned therein are in a thriving and healthy state, and that the fences are in good order, and well secured by posts and rails.

As witness our hands, this 21st day of October, 1799.

ANTHONY GERMAIN, Minister.
WM. FAWCETT, Chapel-Warden.
W. LUND,
T. WRIGHT,
R. TENNANT,
H. MIDGLAY,
W. BURTON,
} Principal inhabitants.

WE, Robert Midglay and William Dawson, being the persons employed to plant the trees, set the quickwood, and do every other necessary business at the above-mentioned plantation, do hereby certify, that we did plant the number specified in the statement, during the beginning of the years 1796 and 1797, and that we have every year since been employed to keep the fences in proper order, and have planted several trees, to make up the deficiency of the few that have died.

As witness our hands, this 30th day of October, 1799.

ROBERT MIDGLAY,
WILLIAM DAWSON.

Obser-

Observations on the preceding Statement.

THE ground on which this plantation is made, is part of an allotment of sixty acres, which was granted, during the protectorate of Cromwell, to the then possessor, as his right on the common of Flaxton. After this event took place, the land was divided into fields of from eight to ten acres each, and several oaks set in the fences, most of which, of tolerable dimensions, have within these few years been cut down, and some yet remain; but the fences are nearly all gone to decay from neglect, and other causes unknown to the present owner. In the year 1792, a small piece of land was taken up, not much exceeding an acre, and planted with 1200 different kinds of forest-trees, the expence of which, with the fencing, amounted to 9l. 1s. 8d. This small experiment appearing to answer every expectation,

pectation, I was induced to make the plantation, as mentioned in the statement, on part of the above moor, the soil of which is a black sand, with a clay underneath, and not of more value to rent in its present state than 2s. 6d. per acre. The situation being low and wet, the whole, excepting two lands at the extremities, was, in the summer of 1795, ploughed, leaving the furrows open, that the roots of the trees might be kept as dry in the winter as the fall would admit.

The reason why the greatest number of oaks were planted the second year, was from an idea that the shelter afforded by the firs having obtained a year's growth, would greatly promote the growth of the oaks; and, in this supposition I have not been deceived, as in the plantation made in 1792, and which was last year joined to this, by another piece of land of about three acres then taken in. The oaks were there set

at

at the same time as the firs, but on one part were not mixed with them; and in that part they thrived so ill, as to make no progress, until some Scotch firs were planted among them; since which they have assumed a different appearance, and are now growing tolerably well. Another advantage, I have observed in planting, arises from having the holes made the year before the plants are put in: by this method the frost meliorates the sod, and makes it, particularly in bad land, finer, which encourages the fibres of the young plants to shoot more freely.

I have remarked that two lands in this plantation were not ploughed; and the reason that induced me to mention the circumstance, was the supposition that the trees would grow best upon the land that was ploughed. In this I have not been disappointed; those that were set upon the two lands not ploughed, having made less shoots than the other; and though they grow tolerably well, yet an evident,

evident difference is observable in the luxuriancy of their appearance, which certainly is an additional proof that ploughing the land, and making the holes the year preceding the planting of trees, is of material consequence in the success of an undertaking of this nature. In this statement notice has been taken of the plants that flourish best. The larch undoubtedly take the lead, a great number of them having this summer made shoots two feet in length. The Scotch firs are the next; the rest do very well, excepting the platinus, Spanish chesnut, and spruce fir. The land is certainly not sufficiently rich for the two former, and they were only planted to make a variety; but why the spruce fir does not prosper so well, being a hardy tree, can only arise from its dislike, probably, to a clayey soil, and its being too wet. The quickwood for the land grows remarkably well, which is in a great measure owing to its being well fenced with posts and rails, the latter wound with thorns,

thorns, and to its being regularly well dressed, dug, and cleaned, at least once a year. The trees planted the second year were not set to make up the deficiency of those which might fail the former season, the whole of the ground having, the two first years, been carefully looked over; and when any tree has been found dead, in general another has been substituted so as to preserve the usual number.

Should the above short remarks tend to benefit persons making plantations, it will be a great satisfaction to me; and I can only add, that if there is nothing new in the observations, at least there is nothing false; and I hope that the certificates which I have annexed, will be sufficiently satisfactory to a Society for which I entertain the highest esteem.

I remain, SIR,

Your very obedient servant,

Nov. 1, 1799. WILLIAM SMITH.

MR. TAYLOR.

SIR,

I WAS honoured with your favour of the 2d instant; and in answer thereto, request you will inform the Society that the whole of the trees are planted in holes at about the distance of seven feet plant from plant; that the different species were intermixed, some attention being paid to plant them upon the soil which was thought best adapted to their growth; that the general width of the hole was nearly a foot square, the depth varying according to the size of the roots. Oak, ash, &c. have most commonly long tap-roots; the different kinds of fir have in general fibrous and spreading roots. The number of plants upon an English acre at seven feet distance, five score to the hundred, will be 889; which multiplied by eleven, the number of acres planted will make 9779 plants. In my statement I mentioned 9665, which makes a trifling difference. I am happy

happy in adding, that at present the plantation is in a very flourishing state; and I have the honour to be

Yours, etc.

WILLIAM SMITH.

Craike,
May 21, 1800.

Mr. CHARLES TAYLOR.

The

The GOLD MEDAL, or THIRTY GUINEAS, at the option of the Candidate, being the Premium offered for planting ORCHARDS, was this Session adjudged to Mr. JOHN LAKE, of Radfield, near Sittingbourne, in the county of Kent, from whom the following Account and Certificates were received, and who made choice of the pecuniary Reward.

SIR,

OBSERVING in the annual publication of the Society for the Encouragement of Arts, etc. an account of premiums offered to the person who shall have planted an Orchard after August 1796, in the most judicious manner, not less than four acres in extent; I request you to lay before the Society the following account of my performances, wishing both to coincide with the views

views of the Society, and acquire some reputation as an Orchardist.

With due regard to the instructions in the volume of the Society's Transactions, during the months of October, November and December, 1796, the land was prepared, and trees planted. No. 1 contains something more than six acres, and is chiefly a strong loam intermixed with flints; these have not been picked off, as from experience it is found to be a material injury to the land to do so. Nearly three acres of this field had been planted with hops two years; and the remaining part, a turnip fallow, was sown with wheat, after the turnips had been fed on the land by fattening sheep, who were likewise fed with oil-cake and beans, with a view to enrich the soil, which, though kindly, was considered as poor. All this was done, and the wheat sown previously to the trees being planted.

Observing too, that, in the Society's Transactions, attention to *shelter* is

strongly recommended, in the month of March following the whole was filled up with hops; this breadth of land being very well situated for this purpose, by plantations, already raised, of Spanish chesnut, ash, etc. on the south-east, and to the west an extended shaw of chesnut, the north and north-east being exposed. Thither I directed a plantation of hawthorn, which has taken good possession of the ground. On two acres towards the south, all are standards, planted thirty-two feet and a half asunder, making forty-one per acre. After this, in order to gain experience, and raise more shelter, I planted the remaining part, about four acres and a quarter, with standards, in a similar manner; then the rows, to this last-mentioned part, were filled up from south-east to north-west by two espaliers, or dwarfs, between each standard tree. The greater part of these dwarfs promise so well, that I have my doubts whether they will not outrun the standards. Be that as it may,

may, each is to be kept regularly pruned, so as not to intrude on the other, and, if possible, to be so left that the trees uniting shall form an actual hedge of fruit, feathering down to the ground. The whole of these standards and dwarfs are apples. I am sorry to observe, that I fell into an error in sowing wheat after the turnips, as the manure, left by the sheep, produced so luxuriant a crop, that the dwarfs on that part, about an an acre and a half, suffered very considerably, notwithstanding great pains were taken by hoeing and clearing the wheat plants several times to a considerable distance. The mischief produced was owing to the crop lodging entirely over the heads of the dwarf trees. They are now rapidly recovering.

N° 2. Farther still, as I have generally observed that when the hops are displanted, the fruit-trees experience a check for several years, and many are often irrecoverably lost; to be convinced of the best mode of raising an Orchard

with or without hops, I planted another at the same time with standards only (all apples), at the distance of two rods, forty trees per acre. This field contains something more than four acres; the situation at the distance of a mile from the other, in an adjoining parish. It has been arable land beyond memory; the soil a dry, hazely loam, to a great depth, and free from flints: it had previously been well cultivated and manured. I do not mention this Orchard as perfect; for, from being confined to a particular sort of apples, considerable difficulty arose in selecting the plants: but it is my opinion, that, twenty years hence, it will make a fine appearance.

For the purpose of guarding this plantation, a shelter of elm, chesnut, and willows, have been planted on the north and east points. The west is fully guarded by a thick elm hedge. Wishing to form each Orchard as near to perfection as possible, a regular attention has been paid to pruning, and likewise taking

taking away the bearing buds, so that no fruit has yet been produced. From the very beginning of this undertaking, I was assiduous in choosing what we deem the proper soil. The manual part has been conducted on the new system of close-pruning, cleanliness and care. The trees, from growing freely, have but very little tendency to moss. The few spots which have appeared this year, I intend to have washed away before the next spring, and likewise to make use of oil as a preservative against this evil.

I shall take due care to send up proper certificates of all the transactions; and should the Society deem my endeavours deserving their reward, I shall feel myself highly honoured by such mark of attention.

I am, SIR,

Your most obedient servant,

AN ORCHARDIST.

Oct. 31, 1799.

To the SECRETARY.

I, Bryan Faussett, of Sittingborne, in the county of Kent, Attorney at Law, having this day attentively examined and inspected two plantations of fruit belonging to Mr. John Lake, of Bapchild, one of which lying at Wood-Street (his own estate there), and the other on an estate belonging to Thomas Skip Dyot Bucknall, Esq. in the adjoining parish of Tonge, do hereby, for the information of the Society for the Encouragement of Arts, etc. certify, that the plantation No. 1, at Wood-Street, contains, according to an admeasurement thereof, taken by Mr. Hogben, now shown me, and hereunto annexed, in the whole six acres, thirteen perches; part thereof, containing four acres, one rod, seven perches, being planted with standard apple-trees at about thirty-two feet and a half asunder, in rows, in the direction from south-east to north-west, with two dwarf apple-trees

trees between each standard; and that all the trees, both dwarf and standards, appear to me to be in a very vigorous and flourishing state: and, as they appear remarkably healthy, and have made very fine shoots, they promise in a short time to be an extremely profitable Orchard. I also certify, that the other plantation, No. 2, in Tonge (called Pantrys), containing also, according to Mr. Hogben's admeasurement, four acres, one rod, thirty-six perches, is planted with standard apple-trees only, at the rate of forty trees on an acre, or thereabouts; and that those trees, though not to appearance in so vigorous a state as the others at Wood-street (which I imagine may be owing to the different state of cultivation, the one at Wood-Street being now planted with hops, and the other at Tonge being old corn land, and now in corn land), yet, nevertheless, they appear to be alike healthy, and the bark or rind of each remarkably smooth and clear,

and free from moss, as are the trees at Wood-Street; that great pains have been taken, and attention paid by Mr. Lake, to procure shelter to each of the plantations, by judiciously planting in the hedge-rows a quantity of ash, elm, willow, chesnut and hawthorn, on the cold sides thereof, which, no doubt, will be a great means to help the trees, and preserve them from the bleak cutting wind and blights. Given under my hand, this sixteenth November, 1799.

BR. FAUSSETT.

I, WILLIAM FAIRMAN, of Lynsted, in the county of Kent, Esq. a Member of the Society for the Encouragement of Arts, etc. have inspected the lands, fruit-trees, and live fences, belonging to John Lake, of Bapchild, Gent. and do certify, for the information of the said Society, that I find the two Orchards specified by Mr. Hogben, Land-Surveyor,

veyor, in a very growing and well-managed state; more particularly the dwarf and standard apple-trees, in point of vigour, in Orchard, No. 1, from its being in high culture as a hop-garden; and it is mentioned to contain six acres, lying in the parish of Bapchild. I must beg leave to observe that the system of planting two dwarfs between each standard, from this attempt, gives great encouragement to those who may inspect their progress, and desire to raise Orchards, as it very much obviates the discouragement many persons feel in being obliged to wait so great a length of time for the standards getting into bearing; as the dwarfs, if they are planted of a proper size, may be suffered to bear the second year, and will produce abundantly till the standards require the ground they occupy; which will be readily given up when they arrive at that size, as the dwarfs by that time will have completed their business, and

the live-fences, which are now in so thriving a state, will then form a complete high shelter. I must beg leave further to certify, that a more skilful and attentive man could not be selected than Mr. John Lake to carry this system on to maturity, as you may depend on his ingenuity and perseverance.

WILLIAM FAIRMAN.

Miller's House,
December 5, 1799.

THIS is to certify, that we, whose names are underwritten, were employed by Mr. Lake, of Radfield, to plant upwards of ten acres of land with standard and dwarf apple-trees. The piece at Wood-Street, in Bapchild parish (about six acres), we planted first with standards, thirty-two feet and a half asunder, and with forty-one trees per acre, this distance best suiting the hop cultivation; for nearly half this land was already planted with hops, and the remaining

remaining part was planted the following spring. On something more than four acres of this land, we added, in the rows from south-east to north-west, two dwarfs between every standard, making eighty-two per acre. On the land called Pantrys, in Tonge parish, containing about four acres, we planted standards only, thirty-three feet asunder, and forty per acre. This land was sown with wheat previous to the planting. On the outside we planted a great number of young elms, willows, chesnuts, and hawthorns.

The whole was executed between the month of October, 1796, and the latter end of January, 1797.

JUSTINIAN CHAMPION, per *mark.*
WILLIAM CARPENTER, per *mark.*

Signed in presence of
WILLIAM LAKE, of Bapchild.

Nov. 16, 1799.

[A further account of Mr. Lake's Orchard, with an engraving thereof, will be found in a subsequent paper on Blight, by T. S. Dyot Bucknall, Esq. See *Plate VI.*]

The

The Sum of TWENTY GUINEAS, being the Premium offered for planting and drilling, between the first of December, 1797, and the first of April, 1798, the greatest quantity of Land, not less than ten acres, with BEANS, and having sown the same land with WHEAT in the same year, 1798, was this Session adjudged to JOHN CARTWRIGHT, Esq. of Brothertoft Farm, in the county of Lincoln, from whom the following Account and Certificates were received.

SIR,

THE inclosed Account and Certificates will explain, in as few words as perspicuity will allow, my culture of Beans and Wheat.

The soil was a hazle-coloured stiffish loam, worth about thirty shillings per acre per annum. In 1796 it had been fallowed

fallowed without dung, and sown with rape, which was eaten off by sheep. In 1797 I had oats on one earth, and in 1798 beans. The operation of sowing Beans began the 2d of February, and was carried with *sets* of ploughs, three ploughs in a set.

The ploughing was so arranged, that the seed was sown in every third furrow, which set the rows twenty-seven inches asunder. The plough, of course, turned over a flag of nine inches. One of the ploughs of each set was drawn by a pair of horses a-head, the other two ploughs by a pair of horses a-breast; and to one of the latter was attached Amos's Drill Apparatus, the coulter of which opened a drill, three inches deep, in the line of union between the flag then turning over and the preceding flag.

With a set of ploughs three in number, and so equipped, every practical farmer will know how to set his ridges, and how to turn every third flag with the drill-

drill-plough, with the least loss of time; as the next adjoining land will always find employment for one of the common ploughs, while it can be spared, after turning its first flag in a land, and until the other common plough, and the drill-plough, have set the ridge of the land, and sown the two first rows of Beans. The plough equipped with horses a-head, or what is termed *single*, is used for turning a narrow flag in the finishing of each land, and for making the water-furrows.

After thus ploughing and sowing, the land was harrowed three or four times, as it required that operation, more or less. The lands being only nine feet wide, I used three harrows tied to a pole of at least that length, so that the horses, drawing at its two extremities, walked in the open furrows, between land and land. After harrowing, the water-furrows were opened by the plough with horses going single, and finally gripped with

with the spade wherever it was necessary to a complete drainage.

As soon as the Beans showed themselves above ground, a one-horse roller was used, and after it light harrows; the horses being kept in the intervals between the rows of Beans. These operations, in some degree, destroyed the weeds, furnished earth to the Beans, and prepared the land for the use of the horse or hand hoe.

The subsequent management began with an old plough originally made nine inches wide, but for this purpose reduced to six inches. With this instrument passing close by the side of the Bean-rows, the earth was turned from them, and of course a ridge of loose earth was raised in the middle of each interval. The Beans thus left on a narrow ridge of earth, were well hand-hoed, and perfectly cleared from weeds.

As soon as the weeds were dead, the narrow plough was again used, and with one

one horse, whereby the ridge of loose earth above-mentioned was split, and part of it thrown to one row of Beans, and part to the other row. In two or three weeks afterwards the rows of Beans were cleared from weeds by hand-picking, and again earthed up by Amos's expanding horse-hoe. If the land had been stiffer, a strong double-mould-board plough would have been necessary for this last-mentioned operation, which finished the culture. In harvesting they were cut with a reaping-hook, and tied in sheaves.

Not having bands enough, which in this country are sometimes made of a species of slight reeds which grow in our ditches, and sometimes of straw, I learned from a labourer to tie the sheaves with the bean-straw. A neighbouring gentleman uses rope-yarn, and states, that by taking care of them while thrashing they will last three seasons.

In 1799, the land, clean and in good order, was sown with Wheat. Where weeds

weeds partially appeared, we scuffled the weeds, collected them with harrows, and burnt them.

Amos's Drill-Plough and Expanding Horse-Hoe are particularly described in his Theory and Practice of Drill-Husbandry, where his Drill Machine, of which I make great use, is likewise fully explained.

By setting the regulator of the Drill-Plough, the quantity of seed to an acre may, according the distance of the rows, be determined, as shown in this table:

Quantity of Seed per Acre.	*Distance between the Rows.*	*Revolutions of the Land-Wheel for one Pint of Seed.*
12 Pecks	20 Inches	18 Revolutions.
12	24	22
10	27	16
9	27	16
8	30	18

I remain,

SIR,

Your obedient Servant,

J. CARTWRIGHT.

Mr. TAYLOR.

I William Amos, Agent to John Cartwright, Esq. of Brothertoft-Farm, in the county of Lincoln, do certify as follows, viz.

First, That between the first day of December, 1797, and the first of April, 1798, my said master sowed upon his said farm, in drills from twenty-seven to thirty inches apart, seventy acres with Horse Beans, at the rate of ten pecks of seed per acre, all which land was sown with Wheat in the said year 1798, except ten acres, which were again sown with Beans.

Secondly, That the operation of drilling began the second of February, 1798, and was finished the seventh of March, and was performed by means of a drill apparatus attached to common ploughs* (on

* Mr. Amos, for a particular account of his Plough and Drill Apparatus, refers to his publication on the Theory and Practice of Drill-Husbandry, printed for J. J. and G. Robinson, in Paternoster-Row.

(on a principle communicated by the undersigned to Arthur Young, Esq.) at an expence of about six shillings per acre, including a full ploughing, and harrowed at two shillings an acre.

Thirdly, That the said Horse Beans were horse-hoed four times, viz. twice skim-hoed, and twice earthed up, at an expence of four shillings and sixpence; hand-hoed once, at three shillings and sixpence; hand-weeded, at one shilling and sixpence; and gripped for about ninepence per acre.

Fourthly, That the said Beans were shorn at 9s. 10s. 10s. 6d. and 11s. per acre, averaging ten shillings per acre. The shearing commenced the twenty-seventh of August, and ended the eighth of September.

*Fifthly, That the produce was four quarters and a half, Winchester measure, per acre; the soil, in general, a pretty good loam, but some more clayey: it was from four to eight inches deep,

the substratum being partly fine sand and partly clay.

*Sixthly, That the straw being too coarse for cattle to eat, it was used as litter in the stables and fold-yards.

WILLIAM AMOS.

I GEORGE BAMBERGER, Clerk to John Cartwright, Esq. do certify, That I know the particulars marked * in the above Account to be correct, and have reason to be perfectly satisfied that all the rest are so likewise.

GEORGE BAMBERGER.

Nov. 1, 1799.

Mr. TAYLOR.

The

The GOLD MEDAL, or THIRTY GUINEAS, at the option of the Candidate, being the Premium offered for cultivating the TRUE RHUBARB, was this Session adjudged to Mr. THOMAS JONES, of Fish-Street-Hill, from whom the following Account and Certificates were received, and who made choice of the pecuniary Reward.

SIR,

THE Certificate which accompanies this communication, will inform the Society that I have planted, in the year 1799, four thousand and fifty-three plants of the Rheum Palmatum, or true Rhubarb; I once more, therefore, present myself as a claimant. Each time I have made my appearance in this character, I have pledged myself to future and more considerable exertions; for every distinction with which they

have honoured me, has been viewed in no other light, than that of a powerful incentive to perseverance; and I need not add, how much gratification it will afford me, if the Society, by their decision on the present occasion, continue to me their good opinion.

The period I have devoted to the cultivation of this valuable drug has now become of a sufficient length to prove experimentally the truth or falsehood of my theories. Happy am I in reflecting, and happier still in communicating to the Society, that since I last had the pleasure of addressing them, I have additional reason for satisfaction. In my former papers (see Transactions of the Society, Vol. XI. XV. and XVI.) having been, perhaps, more than sufficiently minute in describing my system of cultivation, I shall now only notice the nature of the soil and aspect; the former of which is a rich sandy loam, and the aspect inclining to the east and south: and, as the public

lic are in complete possession of the opinions upon which it is founded, there is no occasion to repeat every particular point in the present instance. I shall therefore content myself with merely mentioning some, and enlarging upon others, as necessity may require.

Conceiving it to be good policy for a man to avail himself of every advantage that is presented, I have recommended spring as well as autumnal sowings, and the plants of each, when arrived at a proper size, to be placed in the nursery-bed, at its opposite season. I persevere in this practice, lest the summer, in proving too dry, should be equally detrimental as too wet a winter: but as draining the seed-beds may be so easily effected, and the safety of the plants necessarily ensured; so now, without on any account neglecting the former, I principally depend on the latter sowing for a succession: besides, it is attended with the least trouble and expence; and if

throughout the operation is well attended to, success is nearly reduced to a certainty.

Again, I have somewhere observed, that a proper mode of cultivation would greatly facilitate the cure of this root; in other words, good management will ensure its welfare till its arrival to a proper age: and that this has ever appeared to me of the most absolute necessity, I have never failed to represent. By nothing else can it acquire that degree of woodiness, in which I suspect the principal secret of its cure consists. Age too is necessary to give the plant its proper growth; otherwise, when it undergoes the operation, its pieces will be diminutive, insignificant, and unprofitable. Above all, it is entirely indebted to age for its medical virtues; and I firmly believe, that to this, more than to soil or situation, it is owing that Turkey has been considered superior to the English Rhubarb.

In this place permit me to introduce an opinion that I have for some time entertained

tertained, viz. that those parts of the root are of the finest quality that are the farthest removed from the seed. This difference is easily discoverable from its earliest stages; and so assured am I of the fact, that, but for want of a supply of offsets, and one or two other considerations, I should be almost tempted to abandon my present, in favour of this mode of cultivation. But though, in this respect, the Rhuburb is evidently superior, yet it should be recollected that the other is less precarious, and its growth and produce much more considerable.

Although, according to every public testimony, of which mention will presently be made, I have reason to believe my progress has been more considerable than that of my contemporaries, if there are any, yet I have no conception that we have arrived at the *ne plus ultra*. Let us rather hope, that every succeeding year will be productive of a degree of improve-

improvement proportionate to the advantages of increased experience. As we are so much indebted, therefore, to the age of our plants, let me caution all who have, or may engage in this undertaking, never to yield to impatience; for, with a few persons, the prejudices against the English Rhubarb are many, and deeply rooted; and to this source most of them may be traced. Nor is this very wonderful; for to entertain high expectations of Rhubarb prematurely taken up, is no less extravagant, than to suppose the capacity of a child equal to that of an adult: yet hitherto our market is a stranger to any other than such a commodity.

Another cause may, I conceive, arise (notwithstanding the length of time since the introduction of the palmated, or true sort, into this kingdom, and all that has been written on the subject), from the little or no care that seems to have been taken in selecting and planting it. As

a

a proof of this, it is not many days since I saw a considerable quantity, and neither the purchaser nor planter knew it to be the rhapontic. In justice, however, to medical gentlemen in general, but in particular to those I have consulted upon this subject, I have found them better informed, and liberal to the greatest degree. They entered at once into the views of the Society, and their assurances of cooperation have been fully realized. That I never expected to introduce it into general practice without opposition, is evident from my last papers in 1798; for I there remarked, that very probably, before this could be effected, certain difficulties must be overcome, the principal of which I apprehended to be an almost universal prepossession in favour of foreign commodities. Moderation on the part of the cultivator in the regulation of his prices, and an unwearied attention to its quality, are the only means likely to produce a counteraction. To great atten-

attention to these points I attribute all my success. Mere recommendation ought ever, in such a business as this, to be placed out of the question. If the article will not bear the tests of examination and trial, it should not be indebted to any thing else.

Whenever I have submitted any specimens to public examination, at an hospital or elsewhere, my constant language has been, " I have no wish but that they may rise or fall according to their own intrinsic merit or demerit; and if worthy of approbation, by this mean induce their general adoption. That this being, no doubt, the ultimate object of the Society of Arts, who have thought proper to honour me with several distinctions, I feel myself impelled to forward it to the utmost, and not remain contented with its mere cultivation." I have proceeded to state the great expence this country incurs by so large an importation, and on this account urged its general

general adoption, in order to lessen the expence on the score of duty. That although I am influenced by such motives, and many others, yet my own individual interest I have at the same time fairly acknowledged to be among the the number; and I have concluded with expressing an hope, that while pleading the general as well as my own particular cause, perhaps the benefit of their institution may be the necessary consequence of introducing a valuable and efficacious medicine, at a comparatively trifling expence. I have never yet made this appeal in vain; and the Society will, I dare say, receive with much satisfaction the intelligence that Rhubarb of English growth is now used at Guy's (I mention the hospitals in the order of its introduction), St. Thomas's, and St. Bartholomew's; and is under trial at several others. Still further to inform myself of the public opinion, I lately requested an interview with a numerous and most respectable com-

committee at Apothecaries-Hall: it is impossible, without a breach of propriety, to repeat the compliments its members were pleased to pay me. Whether I deserve them or not, it would be equally improper in me to determine; but of this the Society may be assured, I never will rest till I do. In a word, my purpose was fully answered. The article which I exhibited met with the most unqualified approbation, and full permission was given to publish this circumstance. I beg leave, before I conclude, to apologize for the egotism which prevails throughout this communication. It is scarcely possible to avoid it, when, in cases like the present, a man is under the necessity of speaking of himself.

It is a subject I have much at heart, and it would give me much real concern to keep back a single circumstance likely to be useful to future adventurers. Its production and adoption, with the attendant difficulties, have been to the best

best of my abilities amply considered; the former in the communications beforementioned, the latter in this paper. If the Society are of opinion that the steps I am pursuing to effect this last and desirable purpose deserve success, it will be highly flattering. Under their auspices I commenced my plantation eight years ago, and I hope and trust my proceedings since have been such that the purpose to which it has been appropriated will occasion no regret.

I am, SIR,

Your very humble Servant,

THOMAS JONES.

No. 13, *Fish-Street-Hill.*

Mr. CHARLES TAYLOR.

This

THIS is to certify, That Mr. Thomas Jones, of Fish-Street-Hill, London, has planted four thousand and fifty-three plants of the Rheum Palmatum, or true Rhubarb, in a piece of ground which he rents in this parish.

They were planted in the year 1799, at four feet distance from each other, and have been in a very flourishing state through the last summer.

PETER LEVESQUE.

Enfield,
Feb. 8, 1800.

SIR,

I HAVE taken the earliest opportunity of answering your letter. I can assure you that I have planted for Mr. Thomas Jones, of Fish-Street-Hill, in the parish of Enfield, four thousand and fifty-three plants of the Rheum Palmatum, or

or true Rhubarb, all which are in a healthy state, as is well known to the inhabitants of Enfield, as well as myself; and I flatter myself finer plants never were seen. No expence has been spared in raising such a great number of plants.

I am, SIR,

Your obedient Servant,

JOEL ROWSELL,
Gardener.

Enfield,
March 13, 1800.

SIR,

IN answer to your request respecting the Certificate of Mr. Jones, I beg leave to inform the Society that the signature attached to it is mine. In the course of last summer, I had frequent opportunities of seeing the plantation, which, from its singular beauty, not only attracted my observation, but that of

all the neighbourhood. I have witnessed the progress Mr. Jones has made in the cultivation of Rhubarb from its commencement, for I believe that the first plants which he produced were raised in my garden.

I am, SIR,

Your humble Servant,

PETER LEVESQUE.

Chase Side, Enfield,
March 12, 1800.

Mr. CHARLES TAYLOR.

The

The GOLD MEDAL, being the Premium offered for improving WASTE MOORS, was this Session adjudged to JOHN MIREHOUSE, Esq. of Brownslade, in the county of Pembroke, from whom the following Account and Certificates were received.

GENTLEMEN,

I TAKE the liberty of laying before you the particulars of an improvement effected by me in a distant county, upon a tract of ground of two hundred and seventy-four acres, heretofore a common, and so drowned by total neglect, as to be of no value to the public (unless the grazing and starving a few cottagers cows on its borders can be deemed such), but often in a dry summer proved an inconvenience to the neighbourhood.

The Lord of the manor in which this land is situated, having himself the prin-

cipal right in it, obtained from his copyholders, a few years since, the exclusive property for a very trifling consideration, they never having derived any advantage from it; and for his better security he obtained an act of parliament for its inclosure and drainage.

The land lies between two hills; is about two miles in length, and about a quarter of a mile in breadth; is very flat, and about a quarter of a mile from the sea. The upland water flowing upon it in various places, and having no outlet or passage to the sea, it became a morass inaccessible to cattle, except on its borders. The land lying between it and the sea is an entire sand, through which, in the course of the summer, much of the water made its escape; and, in the winter, frequently flowed over the surface of the sand to the sea-beach, where, having been insulated till it ran over the beach also, it at length forced a passage, which, in the course of a few tides, was completely closed again.

In

In this state the land has probably continued for ages. In the course of the summer it produced sedge and coarse grass, which, dying in the winter, formed a surface, that, when cut, appeared to contain nothing but vegetable substance. Of this surface nearly three-fourths of the whole consisted: the remainder (being the borders adjoining to the high land), having received the waste from them, is raised above the level. This was of course less wet, and contains a fine rich mould of various depths, from one to three feet, below which, in some parts, clay is found, in others, the vegetable substance before described, and in nearly the same state. In the interior of the flat this substance continues to a great depth; indeed, no bottom has yet been found.

The Lord of the manor having obtained his act of parliament, my residence being within a mile of the common, I

proposed to take a lease of it, and bring it into cultivation, provided he would on his part undertake the expence of cutting a drain from the lower end of the common to the sea beach, and of laying down a tunnel through it, according to my directions, by which a regular discharge of water might be obtained. This being effected, and the tide properly guarded against, my lease was settled, and I immediately proceeded in the drainage.

I began by forming the channel on the north side, and by dividing the land into twelve pieces (according to the plan sent herewith) by double ditches of such depths as the fall would allow, from a few inches to four feet. Between the ditches, a space from thirty to forty feet was left for planting willow, (this is successfully executed), as well for shelter as for other purposes. The land, being saturated with water, appeared a perfect sponge, and, as the drains began to take effect, sunk

sunk prodigiously; so that, after repeatedly lowering the ditches from the very tunnel upwards, the surface of the water remained at the same, or nearly the same distance from the surface of the land. Having, however, repeatedly sunk the principal drains and ditches, I at length obtained, about three feet from the water to the surface of the land, *in the lowest parts*, and in others a level fully sufficient for all my purposes.

The cross ditches empty themselves into the drain on the north side, as far as the letter A on the plan. At this point it became necessary, from the low level of the middle parts of No. 8, 9, to close the north end of the ditches, to keep out the flood; and an internal drain was made, in consequence thereof, through the lowest point of these pieces (as described in the plan), unconnected with the principal drain above, but discharging itself into it at the lower point.

The common being thus inclosed and divided, and the ditches being of sufficient depth, I proceeded to drain each division by small internal cuts, about twenty inches wide at the top, of various depths, to three feet and a half, bringing them to six inches in the bottom; leaving those open which were in the direction of the plough, and filling up others with brushwood, which interfered with it, or with the sod which had been cut out of them as a hedge, and, being placed lower in the drain, left a hollow in the bottom. Both these drains answer to my entire satisfaction, and the whole of the land is brought into cultivation. I have expended in this undertaking the sum of five hundred and eight pounds, as certified by the person through whose hands the payments were made to the labourers and others.

The course of husbandry which I pursued, I have particularly described in a memorandum annexed, and numbered as

as the pieces in the Plan; but I beg leave to remark, that the crops of coleseed, as a winter food for sheep, have generally been very fine, and have enabled me to feed great numbers of sheep in the months of January, February, March, and April, and to make them more fat, and in less time, than I have ever been able to do on turnips of the best quality upon my home grounds. The crops of wheat likewise have been very good, and the grain weighty; but the crops of barley and oats have rarely succeeded to my satisfaction. The land on the whole, from being of no value, is already very productive, and will probably, in a short time, become the most valuable meadow of the neighbourhood. The vegetable substance, by being drained, is become a fine luxuriant black mould to the very surface of the water, and grows daily less spongy and more adhesive.

If

If the Society for the Encouragement of Arts, &c. should be of opinion that my exertions are deserving their attention, I shall consider myself as highly honoured.

I have the honour to be,

GENTLEMEN,

Your most obedient
humble servant,

A PRACTICAL AGRICULTURIST.

January, 28 1800.

To the Society for Encouragement of Arts, &c.

Particulars

Particulars of the Husbandry adopted in each Division of the Land improved by a Practical Agriculturist.

See Plan annexed

THIS piece lies on the highest level, and consists of a rich earth washed from the ad-

1794 jacent country. It is drained as the lines are dotted. After once

1795 ploughing, it was sown with oats, and again with oats after two ploughings, and sown with grass-seeds.

1796 The season turning out very wet, it was much poached by cattle, and therefore ploughed

1797 up in the winter, and brought into order for barley. The produce, a fine crop.

1798 Drilled beans three feet apart; the crop but indifferent, but in

1799 good order for wheat; and the wheat-

wheat-crop very fine, notwithstanding the season.

1800 Ploughed up, and prepared for cole-seed.

No. 2. This division was very wet. It had obtained but little of the wash from the country; but having a good fall to the north, was drained, as described, having also other smaller drains covered, and emptying themselves into those that were parallel. Having been formerly cut for fuel by the adjacent poor, it was full of holes. Levelled and pared the surface with a fen-plough from Cambridgeshire; and having well burnt

1795 it, sowed it with cole-seed, which being eat off by sheep, after once ploughing, it was sown with bar-

1796 ley and Dutch clover. The former was a fine crop; but the corn lean. Grazed the clover, which being almost choaked with the natural

1797 natural grass, was ploughed up, and (after one ploughing only) sowed with wheat. This produced a slight crop, but fine and
1798 heavy grain. In the succeeding spring, got into good condition,
1799 and burnt it slightly, and sowed with cole-seed; a good crop al-
1800 ready eat off, and preparing for spring wheat.

No. 3. Equally wet, and in the same state with No. 2. Drained, as described in the plan; but with other intermediate covered drains.

1795 Levelled and sown with cole-seed; a good crop, and, after
1796 once ploughing, sown with oats and Dutch clover: the oats a moderate crop; the clover better
1797 than No. 2, but was soon choaked by the natural grass; continued and remains in grass.

No. 4. Very wet; drained as before, but much of the ground covered with

with water; has never been ploughed; produces good crops of hay (a small part of it having been cut for fuel). It is intended
1800 to be burnt, and sown with cole-seed this year.

No. 5. Three-fourths of this piece remarkably good; the whole in grass; and the remaining fourth being uneven, will be burnt and sown with cole-seed this year. Both these pieces are well drained.

No. 6. Drained as before. Was well
1798 burnt and prepared for cole-seed, and after being eat off by two hundred sheep, and making them
1799 very fat, was sown with barley.—Great bulk—but the corn lean, and hurt by the wet harvest.—Late in the season, the weather allowing, it was twice ploughed,
1800 and sown with wheat in good condition, and now promises remarkably well.

No. 7.

No. 7. Drained as before, but with more labour. — Prepared and
1796 burnt for cole-seed.—The produce abundant. — After the cole-seed was eat off, it was sown with
1797 spring-wheat the 20th of February. The crop appeared good during the summer; but the season being wet, it did not ripen well, after two ploughings.—Sown
1798 with barley—great bulk, but lean corn. — Prepared and slightly
1799 burnt for cole-seed.—The crop was great as before, and at this time supports three hundred and thir-
1800 ty-four sheep. It is intended for oats and seeds.

No. 8. This division was very wet, and required much labour of drainage. The land becoming more flat, the fence-ditches no longer empty themselves into the principal drain. A cut is made from the ditch at A, in the lowest part of

of the land parallel to the principal drain, which receives the water from the smaller drains, as described. It was partly sown
1796 with oats, and partly fallowed (but imperfectly), and the whole
1798 sown with wheat in the autumn, and turned out a better crop than I had reason to expect. It was
1799 afterwards completely drained, and got into excellent condition
1800 for wheat last autumn, and now promises remarkably well.

No. 9. Very wet and very rough; was
1798 prepared and burnt for cole-seed,
1799 and succeeded by barley after two ploughings.—Both crops tolerable, but the barley lean, as before stated. It was at the same
1800 time sown with Dutch clover and rye-grass, and promises well.

No. 10. This piece lies lower than any other part of the flat, and was originally almost entirely covered with

with hillocks of hassock, many of which were three or four feet in height (several of the other pieces had likewise many of these hillocks which contained no soil or earth, but were accumulated sedge and coarse grass). It was with much labour burnt, and got
1796 into order for cole-seed.—Produced a fair crop; was sown
1797 with oats and grass-seeds, and continued in pasture. The whole is now become a black earth, and
1800 carries a great deal of stock; but it has not been mown.

No. The level of these two grounds
11, 12 rises from No. 10 to the extremity of the flat, and is consequently much dryer. Both these grounds
1797 were prepared and burnt for cole-
seed, and in the succeeding spring
1798 sown with oats and barley—the
1799 crops good: after three ploughings were again sown with spring-

corn, Dutch clover, and rye-grass. The crop was but indifferent; but the seeds promise well.

A PRACTICAL AGRICULTURIST.

Jan. 28, 1800.

I HEREBY certify, that the land reported by "A Practical Agriculturist," to the Society for the Encouragement of Arts, &c. was a common surveyed by me previous to its being inclosed; that it comprises two hundred and seventy-four acres, or nearly, of which one hundred and seventy-three are now pasture, and one hundred arable; that when surveyed it was a morass, and so overflown with water, that I could not finish the survey without additional trouble, from being unable to go over it;—that the plan, proposed to accompany this account, is a copy of my original survey, with the addition of the ditches

ditches and fences since made;—that from being totally unprofitable, and for the greatest part inaccessible to stock, it may be considered as an entirely new creation, being drained, and in the cultivated state described in the Plan;—and from my knowledge of its original state, and its present condition, that the sum of 500l. stated to have been expended, has been well and judiciously disposed;—and that, if occupied in one holding, it would let at an average rate of fifteen shillings per acre; but if let to the farms adjoining it, in small lots (for which it is peculiarly adapted), for considerably more; and that, after a very few years, its value will be greatly increased by the solidity which it will attain, and the continuation of the system pursued for its improvement.

JOHN HAND.

Jan. 15, 1800.

I HEREBY certify, that the land reported to the Society for the Encouragement of Arts, &c. by the gentleman whose signature is "A Practical Agriculturist," is situated in the parish of which I am Vicar; that, previous to his undertaking the improvement, it was a common totally unprofitable from its being generally inundated;—that it is now in a fine state of cultivation—produces good crops, particularly of coleseed and wheat—keeps a considerable number of cattle when depastured, and yields abundant crops of hay;—and that this important improvement has been effected by the gentleman above alluded to, of which, from my local situation, I have been almost a daily observer.

CHARLES PIGOTT PRITCHETT, Vicar.

Jan. 24, 1800

Mr. TAYLOR.

PLAN

No. I.

1794 Oats
1795 Ditto
1796 Grass seeds
1707 Barley
1798 Beans
1799 Wheat
1800 Fallow

No. II.

1795 Cole-seed
1796 Barley
1797 Clover
1798 Wheat
1799 Cole-seed
1800 Spring Wheat

No. III.

1795 Cole-seed
1796 Oats
1797 Clover
1800 In Grass

No. IV.

In Grass

No. V.

In Grass

No. VI.

1798 Cole-seed
1799 Barley
1800 Wheat

No. VII.

1796 Cole-seed
1797 Spring Wheat
1798 Barley
1799 Cole-seed

No. VIII.

1797 Oats and Wheat
1798 Wheat
1799 Fallow
1800 Wheat

No. IX.

1798 Cole-seed
1799 Barley
1800 Grass Seeds

No. X.

1796 Cole-seed
1797 Oats
1798 Grass Seeds

No. XI.

1797 Cole-seed
1798 Oats
1799 Ditto
1800 Grass Seeds

No. XII.

1797 Cole-seed
1798 Barley
1799 Oats
1800 Grass Seeds

PLAN OF LANDS

In the County of Pembroke.

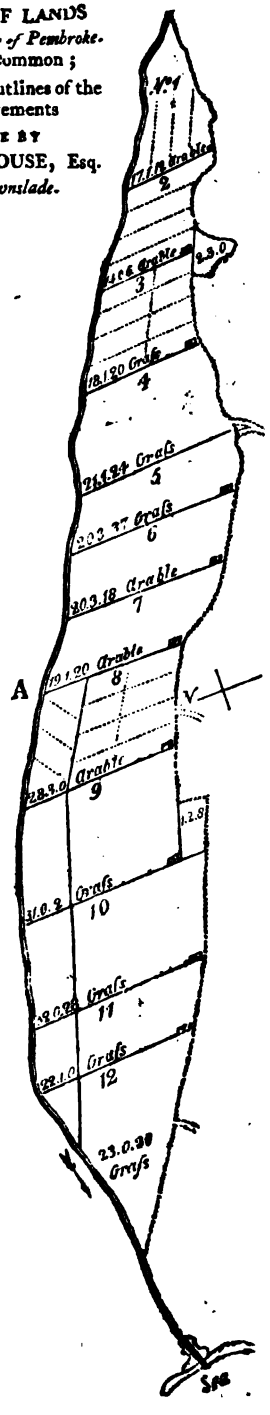
Lately Common;

With the Outlines of the Improvements

MADE BY

J. MIREHOUSE, Esq.

Of Brownslade.



The GOLD MEDAL, being the Premium offered for GAINING LAND FROM THE SEA, was this Session adjudged to the Rev. HENRY BATE DUDLEY, of Bradwell-Lodge, in the parish of Tillingham, from whom the following Account and Certificate were received.

SIR,

A TRACT of land which I inclosed on the same line of coast within this parish about eleven years ago (for which I was then honoured with the Society's Gold Medal), being already under a profitable course of tillage, I was induced to undertake the present inclosure, as a lessee of the collegiate estate of St. Paul's. The front line of embankment against the sea is nearly one mile in length, and, with the returning banks

banks on each wing to the old wall, forms an inclosure of contents, as expressed in the certificate already in your possession. The whole of the embankment is composed of earth alone, borrowed from the irregular salting land in the front, called *chatts*, and taken at the limited distance of twelve feet from the base of the new work, to leave a sufficient foreland for its protection. I found, from experience in my former embankment, that I had not given it a sufficient angular declension in front, for an easy ascent and descent of the waves. This error was therefore corrected in the last work. I began it on a base of thirty-two feet, and wrought it to the height of seven feet, leaving it a plane of five feet on the top, and making the land side of the embankment, as nearly perpendicular as the security of the base would allow.

Within, on the land-side, is cut a ditch twelve feet wide, five feet deep, and four feet at bottom; the earth from which

was thrown into the mound. My former sea-embankment in Bradwell parish had nearly given way to the great inundating tide of February 1792, from this erection of new earth being made on the surface. To guard against similar danger in the present work, a spit-deep trench, six feet wide, was previously cut along the centre of the whole line, on which the mound was to rest; this, by admitting the new earth into an incorporative adhesion with the base soil, renders a future separation almost impossible. Before this, the main rills had been filled and rammed, to give these parts equal solidity with the rest.

The whole operation was performed by a gang of twelve sea-wallers, with barrows and planks only, at one pound ten shillings the marsh rod of twenty feet, and perfectly inclosed in seven months: but it must be observed, that the soil, composed of rich vegetable matter, is without one particle of stone

or

or gravel, and cuts with an iron-edged scoop-tool, so as to load the barrows with great facility. At each end of the front line is laid an out-fall gutter, or sluice, through the whole embankment, five feet in width, by three feet deep, clear in the run; and another of smaller dimensions in the centre, for discharging the land-waters freely to sea. The construction of these aqueducts is too well known to require further description here: probably, however, the little addition given to those erected on this occasion, may be found of some use. Observing it often happen, that, either from accident or design, the outward lid of the sea-sluices remained open, and admitted the tide to the great injury of the fresh waters within the marshes, I introduced here a light fly-lid within the centre of each sluice, which is out of reach, and yields to the slightest pressure of the water going out; but shuts closely against that of the tide, when it passes inwardly

inwardly the external flap. These sluices are laid upon as solid a foundation as can artificially be made on such soils, to prevent the crabs, and other sea-fish, from undermining them, which must otherwise be the case. The frame and flooring are of fir, which lies under water as durably as oak.

The land thus inclosed is partitioned into four nearly equal parts, by new out-ditches, twelve feet wide, five deep, and four at the bottom, which, with small intersecting rills from various parts, give the whole a good drainage of its salts, on the fall of heavy rains: and, by a course recently made from a distant brook, each division of this land is now amply supplied with fresh water. Not less than eight hundred South-Down sheep, and from sixty to eighty horses, are almost constantly grazed, and even winter thereon remarkably well. The establised opinion of the best farmers of the country, was, that land thus taken from the sea would

would not grow corn under thirty years at least after their inclosure. But as no experiment had been made, by which this fact could be clearly ascertained, as soon as I had shut out the sea from a part of it, about six yards square were immediately dug, and sown with horse-beans and oats, which, though the summer proved very dry, and consequently unfavourable, produced of each a fair return of sound, good corn; and the last harvest the same spot being sown with wheat, yielded an excellent crop. The next spring I mean to try it with barley and turnips. My first inclosed lands in this parish have produced two succeeding crops of fine oats, and are now growing a very promising breadth of rape for seed.

It may here be remarked, that the lower oozy parts of the new inclosure, on which no vegetable ever grew before, begin to be coated with various grasses; and as the saline parts die away in other

spots,

spots, for want of their natural moisture, fresh grasses replace them, so that the whole is now nearly covered with grazing plants of good quality, amongst which appear the different *clovers*, *trefoil*, and *rye-grass*, &c. Hence I conclude, but contrary to the general opinion, that though all these grew artificially from seed sown, it does not follow of necessity that they cannot be produced without. I think that the natural operation of the sun and air upon certain soils, will alone effect it; and my experience in lands taken from the sea, confirms very strongly this opinion.

I have the honour to be

Your most obedient servant,

HENRY BATE DUDLEY.

Bradwell Lodge,
December 17, 1799.

Mr. TAYLOR.

THIS

THIS is to certify, that the Rev. Henry Bate Dudley, of Bradwell Lodge, in this county, has this year completed an embankment, with all the sluices and other necessary works appertaining thereto, within this parish, and has thereby effectually obtained two hundred and six acres of land from the sea, which he has subdivided, by twelve-feet ditches, into four spacious marshes.

J. H. WRIGHT,
Minister of Tillingham.

Tillingham, Oct. 1, 1799.

PAPER

IN

CHEMISTRY.

CHEMISTRY.

The GOLD MEDAL, or FIFTY GUINEAS, being the Premium offered for preparing the greatest quantity, not less than twenty pounds weight, of OPIUM, from POPPIES grown in Great-Britain, and equal in quality to the best foreign OPIUM, was this Session adjudged to Mr. THOMAS JONES, of Fish-Street-Hill, from whom the following Papers were received, and who made choice of the pecuniary Reward.

SIR,

IN the summer of 1794 I cultivated a considerable number of White Poppies (entitled in the New London Pharmacopœia, Papaver Somniferum, and, in another place, Papaver Hortense semine albo), when a few of the heads or capsules

having been broken off by the wind, I observed at the extremity of the stalks a substance in every respect resembling Turkey Opium. This accidental circumstance bringing to my recollection its method of production, as related in the Encyclopœdia and elsewhere, I wounded a considerable number of them with my penknife, and, in the course of the day, collected a small quantity of the abovementioned substance. As this circumstance took place while we were cutting lavender, it happened that an old and experienced servant, who was afterwards to distil it, was directing and assisting, and we agreed that it was probably in effect equal *to*, and was certainly more pure than any we had ever seen.

From this period I have never entirely lost sight of the object I am now to consider; but, on account of various avocations, and particularly my Rhubarb plantation, which at this time required all the attention I could well spare, it was not

not in my power to engage in an undertaking of such magnitude; and more especially on a scale so extensive as that which I had already determined to adopt, under a persuasion that experiments, when more confined, are for the most part fallacious.

As preparatory, however, I have not failed every year to repeat the operation, at once establishing its practicability, and availing myself of many advantages which can only be derived from observation and experience.

The inclosed Certificates will inform the Society that at length my plan has been carried into execution, but not with the degree of success that ought, and might have been expected to attend so large and expensive an experiment.

It must be confessed, that had I been at all aware what an almost Herculean labour I was about to encounter, I really suspect whether my resolution would have been equal to the task. Lest, how-

ever, this should discourage others from prosecuting this object, it is necessary to be more explicit.

Difficulties, and such indeed as are considerable, must necessarily attend most undertakings which have been hitherto unattempted; but the disappointments I sustained, though more numerous than generally fall to the share of a person under such circumstances, and more aggravated, did not all arise out of the undertaking itself, but from causes, some of which may be easily guarded against in future, while others may never again occur.

Two years have passed in producing what, I flatter myself, the Society will consider deserving their Premium, particularly if I am enabled to render the operation much more simple than may at first sight be supposed.

The claimant, I observe, is required to submit to the Society his particular method of cultivating the Poppies. As the

the mode adopted in the present instance arose rather from necessity than choice, I must go back as far as the autumn of 1797, to show how it happened.

Five acres of ground and upwards, situated in the parish of Enfield, in the county of Middlesex, I appropriated to this experiment, at the period above mentioned; which, being ploughed several times previous to the following March, were then sown broad-cast; and the weather proving favourable, the seed soon vegetated, and appearances were very promising. From the neglected state of the land, however, to which I was unfortunately a stranger, such a profusion of weeds sprang up among them, that, after many fruitless efforts at recovery, I was under the mortifying necessity of ploughing them all up together. This circumstance not taking place till the latter end of April, the season for resowing was elapsed; and as to cropping my field with oats or barley, a measure

very strongly recommended to me, I considered it as a deviation from my original purpose, and therefore, without paying any attention to it, gave the field a summer-fallowing, conceiving that Poppies might be sown with equal and perhaps greater advantage in autumn.

Finding that the broad-cast method of sowing precluded the possibility of hoeing where the land is much infested with weeds, I now adopted a different mode, and drilled in the seed with a very simple yet efficient machine, which I purchased of Mr. Macdougal, of Oxford-Street: but, as the weather began to be very severe so early as November, and continued so with few intermissions, the succeeding March found me very little forwarder. Yet still I persevered, and once more resolved to drill the whole five acres: they came up extremely well, and, as I expected, accompanied with innumerable weeds; but these by well-timed application were eradicated, though

though not without considerable difficulty.

I now thought myself secure; for nothing could assume a better appearance, till the beginning of May. Alas! I could not foresee the cold and remarkably dry weather that ensued, and prevailed, I believe, for six weeks successively. Hence the growth of some became stunted, and others were entirely destroyed; but happily some warm refreshing showers fell just time enough to rescue the remainder.

From these I have procured upwards of twenty-one pounds of Opium, five of which, in compliance with the Society's requisition, I have sent for their inspection and examination.

At one time I began to despair of even procuring this, comparatively speaking, small quantity, though it is not a fifth part of what I ought to have had, owing to the extraordinary rains and

winds which we experienced through the whole of the summer months.

This recital, as I have before observed, ought on no account to intimidate others from a co-operation; for it is obvious, that the former inconveniences originated in my own ignorance, whilst the latter depended upon causes that in all probability may never happen again.

Mr. Ball, in a letter published in one of the volumes of the Society's Transactions, advances an opinion which I consider as very fallacious, respecting the quality of land adapted to the growth of Poppies. He seems to be very little concerned about this point, and hints the probability of their being cultivated almost every where. I well know that Poppies, like many other vegetables, will grow in soils of every description; but of this I am fully assured, that, like the rest, they have their particular and favourite soil, viz. a sandy loam, and that the better this is, the more advantages

tages will accrue to the cultivator. For it should be considered, that, in bad, as well as good ground, the same expences of cultivation, scarification, and collecting, will be incurred, for perhaps a fourth share of the produce.

There is also another error in the same communication, which, having a tendency to mislead, ought to be pointed out. He tells us, to use his own words, "That, by a calculation he has made, supposing one Poppy growing in one square foot of earth, and producing only one grain of Opium, more than fifty pounds (I suppose he means, of course, apothecaries weight) will be collected from off one statute acre of land." Now, as there are no more than 43,560 square feet in an acre, and allowing one grain for each, the produce can be no more than ninety ounces and six drachms. This calculation appears to me to be as much in the extreme one way, as that of Mr.

breadth; so that the furrows will answer the double purpose of preserving the land throughout the winter, and, in the season for collecting the Opium, serve as paths for the workmen.

Besides two chances of a crop, I am decidedly in favour of autumnal sowing; and the first week in September seems to be the most favourable period for this purpose. If the weather continues open, they will make such a progress as to be capable of resisting the severity of an inclement winter, without on the other hand being too forward; a circumstance highly dangerous, as the first severe frost is inevitably destructive.

On this account, whether by the drill or otherwise, a larger proportion of seed should be sown at this season, for the plants will defend each other; and as all the plants will not be equally forward, so, let the winter prove as it may, provided the seed has vegetated freely, there will be great probability of a good appear-

ance

ance in spring. If unfortunately, however, such a winter as the last should again occur, and the whole plantation fail, a circumstance which has happened to myself, the spring sowing ought not to be deferred longer than the first week in March.

I do not, without sufficient reason, recommend that this operation should be performed in autumn. The Poppies are not only generally larger, but even, when this is not the case, I know from experience, that they will yield a much larger proportion of Opium: for it seldom happens that a spring Poppy will bleed, as we term it, more than twice, while the others will bear scarifying till they are nearly ripe. This I imagine can only arise from the length of time the one has been in the ground in comparison with the other. Indeed, the difference is so striking, that if the present winter destroys my plants, I shall be almost tempted to dispose of my spring-sowing to other purposes.

purposes. In drilling, the necessity of covering the seed by harrowing is suspended by the operation of the machine; and, in the broad-cast method, a shower of rain will have all the effect without further trouble or expence.

Excepting great additional care, turnip and poppy hoeing are similar, and in every respect may be conducted in the same manner. I believe the turnips are rather benefited, they certainly are not injured by being shaken, and will recover from the effects of a wound; but if the Poppies are accidentally touched, they will either exhaust themselves by bleeding, or dwindle so as to be of no value. But it is high time to proceed to the last point I proposed to consider, namely, the production and preparation of Opium.

In ordinary seasons, the heads or capsules of the autumnal Poppies will be large enough for our purpose in the month of June; for at this time they will have attained about half their growth,

or

or be equal in size to a small tea-cup. I have invented a variety of instruments as scarificators; but as only two kinds were actually used, I am unwilling to trouble the Society with a description of any other.*

Seven, and sometimes eight boys, were employed from eight to twelve years of age, together with a man as a superintendant. The children's book, which accompanies the

* *Mr. Jones has since added the following Description of the Instruments, and their mode of application. They remain in the Society's Repository.*

The first of these instruments consists of two thin steel blades fixed by a wedge in a wooden handle, so as to make incisions about one fourth of an inch from each other.

The other is made entirely of steel, and resembles in form the tuning-fork of a harpsichord. It consists of four bars, proceeding from a handle of a convenient length, a quarter of an inch wide, and two and a half long, each terminating with a bolster, through which a screw passes that fixes the scarificators. The centre bars should be so elastic as to yield to the curvature of the capsule, upon the outer ones being pressed by the finger and thumb; and by this means four incisions are made at once, at equal distances. This instrument is an inch and three quarters in width; but, from the two outer blades, only an inch and a quarter. The bolsters are a quarter of an inch in diameter, and the scarificators a proportionate length, namely, three eighths. The wedge in the former, and a longitudinal aperture in the scarificators, or blades, of the latter, will regulate the depth of the incisions, at the will of the operator. It is of the utmost importance that these should not be made through the inner coat of the capsules.

the instruments, contains only an account of six, as the eldest, being the son of my gardener, is included in another book. To the youngest I gave three-pence per day, and, if tractable and well disposed, an additional penny for every additional year.

The steel instrument was used by the latter, and the others by the former. I have great reason to be satisfied with their construction; for, notwithstanding their simplicity, they proved themselves fully equal to my purpose; and so considerable a trial has not suggested any other improvement, than that in the largest the two inner bars only should be elastic; for the continual pressure of the finger and thumb on the two outer ones, which is absolutely necessary for the others to act, would be avoided, and consequently much fatigue and inconvenience prevented.

It is of very little consequence whether the first incisions are made horizontally or vertically, with this instrument; for

for however luxuriantly the milk may flow, by making four at one time, it so divides the stream that seldom any escapes. With the smaller ones we most commonly made them horizontally, beginning as near the top of the head as possible, and for this reason—all the juices, if the first incision was made at the bottom, would be naturally attracted by the aperture, and render every other completely fruitless, besides occasioning the certain loss of a considerable quantity, by falling on the surrounding leaves; whereas, on the other hand, a proportion of milk will exude from each, and the Opium be equally distributed over the whole surface of the head.

No particular directions seem necessary for repeating this operation, any farther than that each time it should be performed in a contrary direction, and continued till no more will exude, at intervals of four or five days or more, according to circumstances; for, as the

 weather

weather proves rainy or fair, they will be shorter or longer, the heads being sooner replenished in the one than the other.

Each of the children being provided with a tin cup, having one handle, so contrived as to fix itself to a girdle fastened round his waist, with a common gardening knife they scraped off the Opium that appeared upon the heads in a soft ash-coloured substance. Dewy mornings are best calculated for this purpose, and it should be discontinued so soon as the sun has gained a sufficient power to dissipate it; for, if persevered in throughout the day, some of the Opium will recede into the interstices, and more, in defiance of every endeavour, will remain upon the heads. The principal quantity exudes in the course of the night, and, uniting with the dew, it is taken off as readily and completely as with a sponge.

Several regulations were adopted to excite, as much as possible, a spirit of emulation. The name of each boy was written

written upon his cup, so as to ascertain, on their return from collecting, who had been the most active. And although, in consequence of the unsettled state of the weather, this part of our process continued so long as from the 6th of July to the second week in September inclusive, the good effects were felt to the last. And, as for the reason already mentioned, an hour in the morning became so invaluable, those who appeared in the ground at five o'clock, at the most busy period, became entitled to an additional penny to their daily pay. This measure succeeded at first only with a few; but the remainder, overcome by shame, at length attended equally well. In addition to this encouragement, I am under an engagement (in case I succeed with the Society), to such whose behaviour has been uniformly good, to celebrate the circumstance by a public dinner.

The interval from breakfast time to sun-set, if the weather assumed a set-

tled appearance, was occupied by scarifying. And here I again felt the good effects of stimulating measures: certain places were allotted to particular children, according to their ability, so as to discover who scarified the most and the best; the superintendant occasionally following all of them, to oberve whether any work was left unfinished, and, if there were any, to complete it. If, in our progress, any one proved refractory, which happened in more instances than one, rather than have recourse to severity, and for the sake of example, he was immediately discharged. I had numerous applications, and the first on the list always had the preference as his successor.

Upon the whole, considering it was the first attempt of the kind, every thing proceeded very regularly; and had the summer been propitious, notwithstanding my former disappointments, I should have had great cause for satisfaction.

The

The largest quantity that my man, seven children, and myself, were able to procure in one morning, from five to nine o'clock, was one pound and a half: this happened when the dew was remarkably great, and succeeded one of the warmest days in the summer.

From the experience I have had, the precariousness of our climate appears to me the only obstacle to the production of Opium in this kingdom. It may be said that the same inconvenience attends every other agricultural pursuit; and that hay, and a variety of productions, particularly hops, are much prejudiced from the same cause. I allow that they are so; but the evil produced by a sudden alteration in this case is irreparable; for, should it happen after a fine scarifying day, we do not only lose the labour of that day, but all its produce. It becomes obviously necessary, therefore, to be particularly circumspect; and this is the only remedy we are able to procure.

The Poppies will receive no damage from remaining entire, while, on the other hand, impatience may be injurious, if not destructive.

As my notes furnish me with no further particulars, I have very little more to add. The Opium, when first collected, from its union with the dew, is much too soft to be so formed as the Society will receive it.

To reduce it to a proper consistence, taking nature for our guide, it should be thinly spread in shallow dishes, and exposed, under glasses, to the rays of the sun. My opinion is, that Turkey Opium suffers considerably from the operation of fire; certain it is, that, with respect to its effluvia, it undergoes a complete alteration. I have covered it with its own leaves, thinking this a very convenient mode of package, and conceiving it to be important, in every new undertaking, by studying appearances, to yield to the general prejudices which naturally

naturally prevail in favour of the article to which we have been accustomed.

I have several times trespassed on the patience of the Society; on the present occasion I have again been seduced into prolixity. I hope they will receive the same apology now as before, knowing so well how acceptable every communication of this kind, though extended even to minuteness, is to the interested inquirer. To the utmost of my power I have complied with the requisition of the Society in Class 175, in describing the mode of cultivating the Poppies, and preparing my Opium; and, in doing this, I can truly say, that every thing which I have advanced is founded on the evidence of facts. I have been unwilling to indulge myself in mere speculation, being of opinion, that a paper of such a description as the present, would prove much more acceptable if confined to experiment alone.

Had it been necessary, I could have introduced a variety of quotations on this subject, describing the method of preparing Opium in other countries; but surely this would have been foreign to the subject. The information which the Society and the public require, is what really has and may be done, as related in this paper. This information does not consist of vague evidence, collected from accounts of doubtful veracity, and of course more calculated to mislead than instruct; on the contrary, I have closely adhered to what I conceived to be the principal intention of the Society; have related nothing but what I actually saw; have confined myself to a bare recital of circumstances; and have only occasionally ventured to make deductions.

I acknowledge, with heartfelt pleasure, the repeated honours with which the Society has distinguished me; and am not without hope, that this additional proof of perseverance and exertion will also

also receive its approbation. With the certificates, I have inclosed a very flattering letter from Dr. Woodville, author of the Medical Botany. It in a great measure proves, that if the practicability of preparing this inestimable medicine in this kingdom can be established, the Opium itself posseses every quality that can be desired.

I remain, SIR,

Your most obedient servant,

THOMAS JONES.

No. 3, Fish-Street-Hill,

Mr. TAYLOR.

SIR,

I CALLED yesterday morning to examine the Opium collected by you from the capsules of the White Poppy; and I have no doubt, from its taste, smell,

smell, colour, and purity, but that it is more powerful and efficacious than the best foreign Opium imported into this country.

The late Dr. Alston, when Professor of Botany and the Materia Medica in the University of Edinburgh, informed the public, more than sixty years ago (see Med. Essays, vol. V), that the milky juice, drawn by him from the heads of the White Poppy, soon acquired the consistence of Opium, when its taste, smell, faculties, &c. were the same as those of that drug.

In the year 1791 I convinced myself of the truth of his assertion, by repeating his experiments, which I noticed the following year in my Medical Botany. Soon after this time I appropriated a part of the garden at the Small-pox Hospital for the growth of the Papaver Somniferum, from the green capsules of which were collected between two and three ounces of Opium, which was found to

to be more efficacious than that of the exotic, as appeared upon trials of it made by several of my medical friends. But the great trouble and length of time required for the collection of the juice, induced me at that time to think, that the manufacture of this valuable medicine in England, did not hold forth any prospect of commercial advantage. However, since I have seen the great quantity of it collected under your direction, I sincerely hope that the above opinion will prove to be unfounded, and congratulate you on your success.

Your obedient servant,

W. WOODVILLE.

Ely Place, February 25, 1800.

Mr. JONES.

SIR,

I BEG leave to acquaint you for the information of the Society instituted for the Encouragement of Arts, &c. that I have

I have this day ascertained the weight of a parcel of Opium, collected by Mr. Thomas Jones, of Fish-Street-Hill, from his plantation of Poppies at Enfield, and find that it amounts to twenty-one pounds seven ounces.

I conceive, from its pungent and bitter taste, that it is equal to the best Opium we receive from Turkey, with the advantage of its exceeding in purity any parcel of this drug I have ever seen imported from thence. I cannot but remark the ingenuity of the imitation of its form, which resembles many of the pieces we are accustomed to receive it in from the Levant.

I am, SIR,

Your most obedient servant,

JOHN HORNER.

Bucklersbury,
February 24, 1800.

Mr. CHARLES TAYLOR.

To

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

I WILLIAM DUNCAN, of Philpot-lane, in the city of London, chemist and druggist, do hereby certify, that I have examined twenty-one pounds seven ounces of Opium, made by Mr. Thomas Jones, of Fish-Street-Hill, from Poppies grown on his plantation at Enfield; and I declare, that it appears to me to be as fine Opium as the best I have ever seen in the course of my experience, for upwards of thirty years: and I further declare, that the whole of the said twenty-one pounds seven ounces, is of equal quality with the five pounds sent herewith for the inspection of the said Society.

WILLIAM DUNCAN.

London,
February 25, 1800.

The

The Committee of the Society for the Encouragement of Arts, &c.

GENTLEMEN,

AGREEABLY to your request to the Physicians of St. George's Hospital, conveyed in a letter of the 5th of May last, I, as one of that body, return you the result of the trials made with the English Opium, in a few cases under my care.

1st. In a case of acute rheumatism, the effects of this drug in *sweating*, in *allaying anxiety*, in *abating pain*, and in *producing sleep*, were the same as from the same doses of foreign Opium, administered in a similar manner in like cases.

2dly. In a disease of the bowels, attended by pains in different parts, with sometimes diarrhœa, and at other times with constipation and distention, the English Opium *alleviated the pain*, and *restrained the evacuations*, as might have been

been expected from the foreign article.

3dly. In an instance of chronic rheumatism in one thigh, the English Opium produced *rest*, *warmth*, *perspiration*, *relief from pain*, and occasioned *costiveness*.

4thly. The English Opium aggravated the complaints in a case of hysteria, especially occasioning *sleeplessness*, *vertigo*, *sickness at the stomach*, and a *more frequent return of the paroxysms*; and similar effects ensued from foreign Opium.

If a larger quantity of the drug, whose virtues were to be determined by experience, had been sent, more trials would have been made; but I have no doubt that the same effects, and by at least as small a dose, would have been produced by it as by the best foreign Opium.

I have the honour to be,

GENTLEMEN,

Your most obedient servant,

G. PEARSON.

Leicester Square, June 4, 1800.

To

To the Committee of the Society for the Encouragement of Arts, &c.

GENTLEMEN,

AGREEABLY to your request, we have tried the Opium you were so good as to send to the Hospital, and am sorry, in the short time in which you desired an answer, that we have had only one case to give it a fair trial, namely, Elizabeth Spraughton, who has been several weeks under the care of Dr. Vaughan with a diseased state of stomach, and in whom we suspect a schirrus of that viscus. She has been in the habit of taking one grain of Opium every four or six hours, according to the violence of pain which she suffered. On the sixth of May she began with your English Opium, made into pills of one grain each, and found as much relief as she used to do from the foreign Opium.

She

She has continued taking them ever since, and with the same effect.

I remain, GENTLEMEN,

Your obedient humble servant,

G. E. LAWRENCE,
Apothecary.

Middlesex Hospital,
May 21, 1800.

THE Committee of Chemistry, to whose examination the English Opium, prepared by Mr. Jones, was referred by the Society, ordered samples of the Opium to be left with several eminent chemists for their analysis and judgment; in consequence of which, the following preparations were laid before the Committee by those Gentlemen, viz.

Extract of English Opium in proof spirit.

Hard Extract of English Opium.

Watery extract of English Opium of the late Dispensatory.

Tincture of English Opium of the present Pharmacopœia.

Tincture of English Opium of the late Dispensatory.

English Opium powdered.

Similar preparations of fine foreign Opium were produced in comparison.

From the general result of these experiments it appears, that Mr. Jones's English Opium is equal in quality to fine foreign Opium; and the certainty of its growth in this country, preparation, and efficacy, fairly established.

PAPERS

PAPERS

IN

MECHANICKS.

MECHANICKS.

The GOLD MEDAL, or ONE HUNDRED POUNDS, at the option of the Candidate, being the Premium offered for the Discovery of a Quarry of MILL-STONES, similar to the Stones known by the name of FRENCH BURRS, was this Session adjudged to Mrs. CATHARINE BOWES, and her CHILDREN, by her late Husband, Mr. RICHARD BOWES, of Conway, in North Wales, and who made choice of the pecuniary Reward. The following Accounts and Certificates were received relative to these Mill-stones.

SIR,

THE Rev. Mr. Hughes, of Kemel, has done me the honour of a call, and desired me to give you an account of the

Burr-Stone Quarry, and to send you specimens of the stone. A box of them, therefore, is sent to you by the mail of this day.

The quarry, which I hold from the liberality of J. Sneyd, Esq. of Belmont, in Staffordshire, is situated within the Corporation Liberties of Conway: the stone appears within a quarter of a mile of that town, and extends from east to west for the distance of two miles, appearing in most places upon the surface within that distance. Such an immense body of the stone has been left bare and exposed to view, that the industry of ages would scarcely lessen it. A deep chasm intervenes at the end of two miles; and, on examining the same line across this valley, I find the stone mixed up with various other fossil substances, to which it seems to bear no relation. In the next rise of mountains it resumes its quality, and takes a southerly direction, passing

passing through a range of hills to the distance of two miles more, where the vein disappears. It is every where the highest stratum; and, when disengaged from the quarry where now worked, it tumbles down the side of the mountain to the plain within five hundred yards of the shipping-place, where small vessels may lie safely in all weathers at a natural quay, completely calculated for this business.

The quarry lies on the decline of a hill: the vein now is about eight yards wide; but we have reason to suppose it is wider below. At the depth we have sunk, which is at least twenty-five feet, the stone mends in quality. When first taken from the quarry it is much softer, and easier wrought into shape, than when exposed to the air; even a day makes a difference. The vein appears to me quite inexhaustible, and contains every variety of the stone, cellular, close,

hard, or soft. The right in this tract of country has been presented to me by Mr. Sneyd, under the hope that I might be able to make this discovery, and carry it vigorously into effect, in which he has not been disappointed. I came into possession on a Wednesday in August, 1797; I set hands to work the remainder of the day.—I had a quantity shipped on the Saturday—it arrived at Liverpool on the Sunday, and was under manufacture on the Monday morning. In order to entitle me to the Premium for the discovery and application of the Burr-stone Quarry, I inclose, for the inspection of the Society, several papers to certify the truth of my claim, and to show the progress I have made. There are two Papers from the hands of our Clergyman and Churchwardens, also from the Officers of the port of Conway, proving that I have carried the trade to a considerable extent: this has been done against

against the prejudices of a very confined neighbourhood, during the time I was unacquainted with their language, and entirely a stranger in the country. The money I have expended in this pursuit was the saving of a life of labour; and I have no resource but the Burr-stone quarry, and my own industry, for the maintenance of a wife and family. I have also a numerous working establishment depending upon me for support, which I have drawn together from different quarters.

When favoured with your Society's notice, it will prove to the kingdom at large the estimation in which this material is held, and assist to do away the prejudice attending all new pursuits.

A pair of mill-stones, four feet diameter, shall be laid down for the inspection of the Society in the Adelphi; and I will attend the Committee, to reply to any other

other inquiries they shall think proper to make.

I am, SIR,

Your obliged and obedient servant,

RICHARD BOWES.

Conway,
December, 1799.

To the Secretary of the Society for Encouragement of Arts, &c.

WE, the Minister and Churchwardens of the parish of Conway, do hereby certify, at the desire of Richard Bowes, that a Quarry of the material called Burr-stone, similar to that called French Mill-stone, has been opened in the Liberties of the Corporation of Conway, several cargoes of which have been shipped from this port, by the abovementioned Richard Bowes, at his own risk

risk and charge. A manufactory thereof is begun, and a number of workmen regularly employed; consequently the industry of the neighbourhood, and the general interest of agriculture, are promoted.

EDWARD OWEN, Vicar of Conway.

For self, and my Colleague in his absence,
ROWLAND JONES.

Conway,
December 5, 1799.

WE, who have hereunto set our names, do certify, that Richard Bowes has opened a Quarry of Stone within the Liberties of the Corporation of Conway, resembling the French Burr, used for grinding corn. Several cargoes of this stone have been shipped from hence for different parts, and a considerable quantity is at this time ready for shipping. A manufactory of this material

rial for making mill-stones has been opened here by the said Richard Bowes; and we are of opinion, with other persons who are competent judges in the milling business, that the said stones are a complete substitute for the French Burr, and that they will operate on grain equally.

WILLIAM ELLIS, per Co. Officer and Collector.

SAMUEL READ, Comptroller.

WILLIAM JONES, Tide-Surveyor.

Conway,
December 6, 1799.

WE, the Millers to Mr. Blundell, at Beverton-Bush Windmill, do hereby certify, and are willing, if required, to make oath, that we have worked the Welch or Conway Mill-stone, above four feet in diameter, upon wheat for several months past, in opposition to a French

French stone; and, it is our opinion, that it operates on the grain, and produces as good flour as the nature of the wheat wrought upon will admit, and approaches, both in texture and effect, nearer to the French Burrs than any we have ever known.

PETER CALAVAL.

WM. MYVING.

Witness,
SAMUEL LARIGO.

Liverpool,
December 20, 1799.

I HENRY GARDNER, millwright, and mill-stone manufacturer, do hereby certify, at the desire of Richard Bowes, that I have manufactured into Mill-stones about twenty tons of the Conway Burr-stone, for the purpose of grinding wheat; that five pairs, above four feet diameter, are composed of that stone

stone only, three pair of which are in actual work; and the principal part of the remainder of the twenty tons has been intermixed with French Burrs in the manufacture of Mill-stone, it being my opinion that they are a good substitute for the French.

HENRY GARDNER.

Witness,
SAMUEL LARIGO.

Liverpool,
December 20, 1799.

SIR,

WE comply with your desire in noting the present situation of your cargo of Welsh Burr-stones, which, shortly after landing, we brought home to our own stores. The quantity is about forty tons; and we manufactured them into Mill-stones, with as much success as could be expected to attend a new

a new undertaking of the kind, particularly as we were not then acquainted with the best mode of making them up: of course, as the readiest method, we put the face of the burrs to the work, instead of the ends and edges; this mistake we have lately rectified, and find such stones as have been made on the improved plan, will answer as well as could be possibly wished. Indeed, from the reports of the millers at present working the three pair properly made, we have every reason to expect, that the importation of French Burrs will hereafter be discontinued, at least to this part of the kingdom. In the cargo we received one perfect Mill-stone, with the eye formed: it measures at present about five feet, and, when rounded for work, may measure about four feet ten inches, which is reckoned a large stone. We have not yet offered it for sale, as we wish to keep it as a sample of what your quarry can produce if properly encouraged, as nothing,

thing could show its superiority over the French more than this stone, which comprehends, in one body, at least the size of from twenty-five to thirty-three of the Burrs we usually receive from the French coast. We have nothing particular to add, but that we have within the last month procured three very expert hands, who have been used to this kind of work; of course we expect a few weeks will now complete a fresh quantity, as we have not, at present, a single stone remaining unsold of those made on the improved plan.

We remain respectfully,

Your most obedient servants,

EDWARD STEPHENS and Co.

Dublin,
December 26, 1799.

Mr. RICHARD BOWES.

In

In addition to the above testimonials, the Society have received the following Certificates, viz. from Mr. Samuel Larigo, of Liverpool, stating the opinions of the working millers at that place, that, with proper selection in the combination of the Mill-stones, the Conway are a good substitute for the French Burr-stones; and that he had paid duty for fifty tons imported into the port of Liverpool.—From Mr. Robert Heakesly, of Liverpool, stating, that he had purchased a cargo of the Welsh Burrs, and had manufactured one pair of stones above four feet diameter; that he is of opinion that they are of the nature of the French Burr-stone, and a complete substitute for that article; that, from every information he could collect, the discovery is of considerable importance to the public in general, and to the agricultural interests of these kingdoms in particular.—From Mr. James Lund, Mill-stone Maker, and Mr. Joseph Tyrer,

Millwright, both of Liverpool, certifying, that they had seen and considered the nature and appearance of the Conway Burrs, and were of opinion, that they are a perfect representative of the French Burr-stone, and that, under such impression, they had purchased a quantity, and vested a sum of money therein for the purpose of manufacturing it into Millstones.—From Mr. Edward Doughty, of Bristol, stating, that he had received from Mr. Bowes a cargo of Conway Burrs, consisting of upwards of forty tons; that from his observation while under the tool, and from the texture of the Burr-stones, he was firmly of opinion they would answer the purpose of French Burrs; and that he had been a manufacturer of that article more than ten years.—From Sir Joseph Banks, noticing, that the certificates Mr. Bowes had produced to him were perfectly satisfactory, and had convinced him that the

the discovery was of considerable importance to the public.

Mr. Robert Ardlie, of the King's Mills, Rotherhithe, observed, in a note to the Society, that a pair of the Conway Burr-stones had been worked there ever since the month of August last; that on weak streams of water, and where they were not required to grind faster than at the rate of three or four bushels an hour, they would answer the purpose; but that he was doubtful whether they would be equal to good French Burrs.

Mr. Joseph Jackson, of the Tide-Mills, Liverpool, informed the Society that he had only tried a single mill-stone made from the Welsh Burrs, which was a bed-stone; that the stone which he worked upon it was a very fine French stone, and that they answered very well together.

The Committee, to whom the examination of the merits of Mr. Bowes's Mill-stones was referred by the Society, de-

sired the attendance of Mr. Fowles, of London-Bridge Water-works, and Mr. Norton, of Tooley-Street, Millwright: these gentlemen obligingly waited on the Committee, when Mr. Fowles gave it as his opinion, that if a proper person was appointed to the superintendance of the Conway Quarry, stones would be brought from thence fit to answer every purpose of the French Burrs; Mr. Norton was of the same opinion; and further observed, that he had occasionally purchased large quantities of Burr-stone from France; that the French Stones differ much in quality from each other; and that, in some parts of England, the preference was given to one kind, and in other parts to other kinds. Mr. Norton remarked, that wheat differs in hardness and texture, according to the soil on which it is produced; that the wheat of different districts, therefore, required stones of various degrees of hardness and texture to grind it; and the

the Conway Quarry seemed likely to answer the purposes of the different counties, from the varieties of texture in the stone which it furnishes. He further noticed generally, that the mill-stones, formed from large pieces, are not usually so good as those made from small pieces of stone properly selected, large pieces being seldom uniform in quality. Mr. Middleton, of Lambeth, confirmed Mr. Norton's observations on wheat; he also produced specimens of French Burr-stones, which the Committee compared with the specimens of Conway Stone, from which, on examination, they did not appear essentially to differ.

A remark has already been made, that the Conway Stone becomes much harder by exposure for a length of time to the air. From external marks, it appears to be composed of quartz and cherts. It has been observed, that the Conway Stone has been manufactured into Mill-stones within a few days from the time

of its leaving the quarry; and that, even under this disadvantage, it has given satisfaction to the persons who have used it. It is not unreasonable to conclude, that, by allowing it to harden in the air for the time which intervenes from the separation of the French Burrs from their quarry, to their actual use in England, and forming the Conway Mill-stones upon the principle noticed in the letter received from Messrs. Stephens and Co. above quoted, they will supersede the use of French Burrs, and become a great national benefit.

It is much to be lamented that Mr. Richard Bowes died at Conway in March last, leaving a widow and two children, before he had acquired a fortune due to his unremitting attention, industry, and merit.

The Society has been lately informed, that Mrs. Bowes is at Conway, and that Mr. B. Chetney, of Newcastle, in Staffordshire, has the late Mr. Bowes's affairs in his hands.

The

The GOLD MEDAL, or FORTY GUINEAS, at the option of the Candidate, being the Premium offered for inventing a PARISH or FAMILY-MILL, was this Session adjudged to Mr. THOMAS RUSTALL, Wheelwright, of Purbrook-Heath, near Portsmouth, and who made choice of the pecuniary Reward.

THIS Mill promises to be of great public utility, as it can be constructed at a moderate expence, and stands on a small space of ground. It may be worked within a room in a farm-house, or even in a public kitchen, without occasioning much incumbrance.

Its peculiar excellence consists in this circumstance, that, from the vertical position of the stones, action may be given to it without the intervention of cogs or wheels: it may be used to grind malt, to bruise oats for horses, or to make flour, or for all these purposes; and it

can easily be altered to grind fine or coarse, as occasion may require.

It may be worked by one man; but if two persons are employed, it will furnish, in two hours, a sufficient quantity of flour to serve a family of six or eight persons for a week. The farmer, by allotting half an hour's time in the evening for its use, may make comparative experiments of the quality of his grain, and, at a trifling expence, provide himself with flour from his own wheat, without fear of sophistication, or being liable to the caprice or defrauds of a miller.

Repeated satisfactory experiments have been made with this Mill before Members of the Society; and the original Mill is now in their repository for the inspection of the public.

The following Certificate was received with the Mill;

THOMAS RUSTALL, of the parish of Farlington, in the county of Southampton, Wheelwright, having bestowed

stowed a great deal of time and expence in inventing and making a new Hand Corn-Mill, and having received two letters from Mr. More, the late Secretary of the Society, encouraging the same to be brought up and exhibited to the Society on the first Tuesday in February next:

We, the undersigned, do hereby certify, that we have seen the said Mill at work, which grinds the corn very well, and at the rate of one bushel of wheat within the hour, by the assistance of one man and a boy. The inventor is a poor man, with a large family, and we beg leave to recommend him to the Society's notice. Dated at Farlington, the 27th day of January, 1800.

G. RICHARDS, Minister.
GEO. PLUMMER, Churchwarden.
JAMES MOORE, Inhabitant.

To the Society for the Encouragement of Arts, Manufactures, and Commerce, London.

Reference to the Plate of Mr. RUSTALL'S FAMILY-MILL. *(Plate I. Fig.* 1.)

A, the handle of the Mill.

B, one of the mill-stones, about thirty inches diameter, and five inches thick, moving with its axis C.

D, the other mill-stone, which is stationary when used, but may be placed nearer to, or further from, the moveable stone B, by means of three screws passing through the wood-block E, which supports one end of the axis C, after it has passed through a perforation in the centre of this bed-stone. Through this hole also the grain passes from the hopper F into the Mill.

F, the hopper, to which an agitation is given by two iron pins fixed on the axis C, which alternately raise this hopper containing the grain intended to be ground: the hopper sinks again by its own weight: the corn is delivered by this

this motion through a spout, passing from the said hopper into the centre of the Mill behind, and through the bed-stone D.

G, a paddle which regulates the quantity of corn to be delivered into the Mill; a greater or less quantity of which may be furnished, by raising or lowering the paddle.

H, the receptacle for the flour, into which it falls from the mill-stones when ground.

The bed-stone D rests upon two supporters of wood, one of which is shewn at I: these supporters are screwed to the block E, and also morticed into the lower frame-work of the mill at K: the frame-work is held together by pins or wedges L L L, which admit the Mill to be easily taken to pieces.

M, a fly-wheel placed at the furthest extremity of the axis C. On this fly-wheel another handle may be fixed occasionally.

N,

N, a small rail which preserves the hopper in its place; the furthest part of the hopper rests on a small pin, which admits sufficient motion for the hopper to shake forward the corn.

O, a spur-rail, to strengthen the frame-work of the Mill.

P, the front upright, which is morticed into the frame-work of the Mill; this is a rest for that end of the iron axis C which is next the handle. There is a shoulder on each end of the axis, to keep it steady in its place.

N. B. A cloth-hood fixed to a broad wood hoop, is placed over the stones whilst at work, to prevent the fine particles of flour from flying off.

Account of Mr. RUSTALL'S BOLTER.

A bolter or sifter to separate the flour from the bran, being necessary to use along with the Mill above described,

Mr.

Mr. Rustall furnished the Society with one made upon a very useful and simple construction, which is also placed for inspection in their repository. This machine is applicable to other purposes; and as its being generally known may prevent many inconveniences which attend the levigation of noxious articles, and a waste of their finer particles, an engraving and description of this Bolter is annexed for the benefit of the Public.

Plate I. Fig. 2. represents the bolter, the front of which is removed, to show its interior construction; its length is 3 feet 10 inches, its breadth 19½ inches, its depth 18 inches.

A, is a moveable partition, which slides about four inches backwards or forwards from the centre of the box, upon two ribs of wood, fixed to the back and front of the box, one of which ribs is shown at B.

C, the lid of the bolter represented open.

D,

D, a slider moveable in a groove in the lid by two handles on the back of the lid.

E, a forked iron fixed in the slider D: this fork, when the lid is shut, takes hold of the edge of the sieve F, and moves it backwards and forwards on the ribs of wood B, as the slider is agitated.

G, a fixed partition in the lower part of the centre of the box, to separate it into two equal parts, in order to divide the fine and coarse flour; the slider A moves about four inches each way from this partition, and thereby gives room for the sieve F to be worked.

H, a board parallel to the bottom of the bolter, and forming part of the slider A. The use of this board is to prevent any of the sifted matter from falling into the other division.

I, represents two of the back-feet on which the bolter stands.

Plate

Mr. Tho.s Rustall's Family Mill, and Bolter.

Fig. 1.

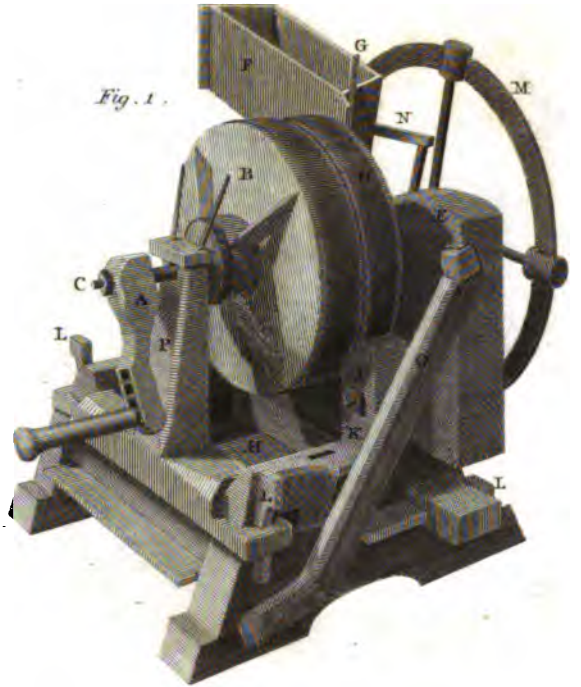


Fig. 3.

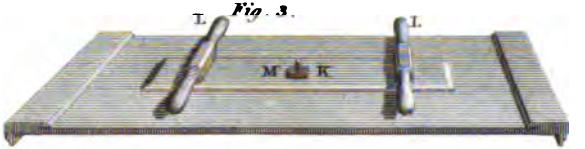


Fig. 2.

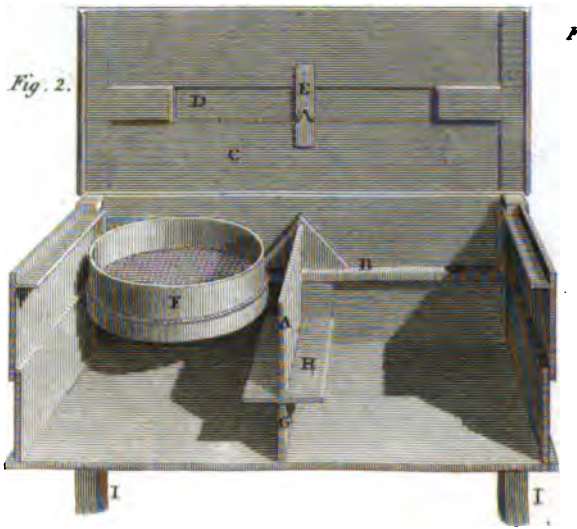


Fig. 4.

Plate I. Fig. 3. shows the top or upper part of the lid of the bolter.

K, the slider which moves the length-way of the bolter.

L L, handles which work the slider.

M, a screw holding the fork which gives motion to the sieve.

Plate I. Fig. 4. the forked iron shown separate from the lid.

A Bounty of FIFTEEN GUINEAS was this Session voted to Mr. S. HOLMES, Smith, of Castle-Court, in the Strand, for an OVEN, of his invention, heated without Flues, of which a description and print are here given, and which Oven is reserved by the Society, for the inspection of the Public.

SIR,

I TAKE the liberty of presenting, for the approbation of the Society, an Oven upon a new plan, which I call a Conducting Oven. The Ovens in general use are made with flues, which destroy a great quantity of fire in its passage through them, and much trouble is required to keep them heated. The fire which should be employed in roasting meat, is in a great measure dissipated in the flue of the common Ovens, if used at

at the time of roasting, or the common oven does not require sufficient heat to answer the purpose, unless much coal is consumed.

My invention consists of a cast-iron Oven, with a solid piece of iron projecting from its side into the fire, in which this piece constantly remains, and becoming red hot, communicates sufficient heat for baking to the whole Oven, and even assists the fire in roasting.

My Oven keeps continually at a baking-heat, without expence or trouble, as the common fire is sufficient for the purpose. The first Oven, which I made for experiment, was fixed in my own house, for use, eighteen months ago, and may be viewed at any time the Society think proper. Others are also in use at Mr. Blackmore's, in Brompton; Mr. Esdale's, the Banker, in Clapham; Mr. Robinson's, at Kensington; Mr. Roe's, at Battersea; and the Rev. Mr. Wise's, at Carlwood; all of which have even exceeded my expectations.

I have no doubt, if you think it necessary, that those gentlemen will give me certificates of their utility.

I should desire you would excuse my giving you this trouble; but as I know the liberality of the Society, where any improvement is made that may be of advantage to the public, I am emboldened to lay this invention before you, requesting such reward as it may be thought to deserve.

I am, SIR,

Your most obedient Servant,

S. HOLMES, Smith.

Castle-Court, Strand,
April 2, 1800.

MR. CHARLES TAYLOR.

MR.

MR. HOLMES has put up one of his new-constructed Ovens at Mr. Roe's school, in Battersea, which answers the purpose exceedingly well.

THOMAS ROE.

No. 58, Strand.

I DO hereby certify, That Mr. Samuel Holmes, smith, of Castle-Court, has put up in my house an Oven upon his new construction, with a knob on the side; which Oven answers every purpose for which it was intended, and bakes equally well with a baker's oven.

EDWARD BLACKMORE.

Old Brompton, April 17, 1800.

Mr. HOLMES,

THE Oven you have put up for me answers the purpose well; and should it lie in my way to recommend you, I shall feel a pleasure.

Yours truly,

J. NIXON.

No. 2, Little Britain, April 10, 1800.

Mr. HOLMES,

IN answer to your application for my testimony respecting the Oven you applied to the side of my kitchen-range, I am happy to say, that in point of heat, it has answered full as well as the iron ovens heated by separate fires.

I am, SIR,

Your humble Servant,

SAMUEL SAXON.

Cannon-Row.

IN order to ascertain fully how the Oven answered, a Committee, appointed by the Society, ordered, on the 17th of April last, two Ovens, of similar forms and dimensions, to be fixed to the sides of a fire grate, in the model-room of the Society, one of which ovens only differed from the other by the piece of cast-iron projecting from its side into the

the fire: both ovens were heated by the same fire, and fixed in mortar and brick work in a similar manner.

Two loaves, of equal size and quality, being prepared from the same dough, one was put into each oven; and after remaining therein three quarters of an hour, they were taken out at the same time, and examined. The loaf from Mr. Holmes's oven was in every respect well baked, but the other was dough-baked and imperfect. An Oven upon Mr. Holmes's construction has been fince fitted up in the Register's kitchen, which appears to answer every purpose that could be expected from its size, which is $13\frac{1}{2}$ inches wide at the door, or in front, and 15 inches deep.

A reference to *Plate II. Fig.* 1 and 2, will explain more fully the construction of the Oven, and its principle of action.

Fig. 1. A perspective view of the Oven,

2. A horizontal section of the same.

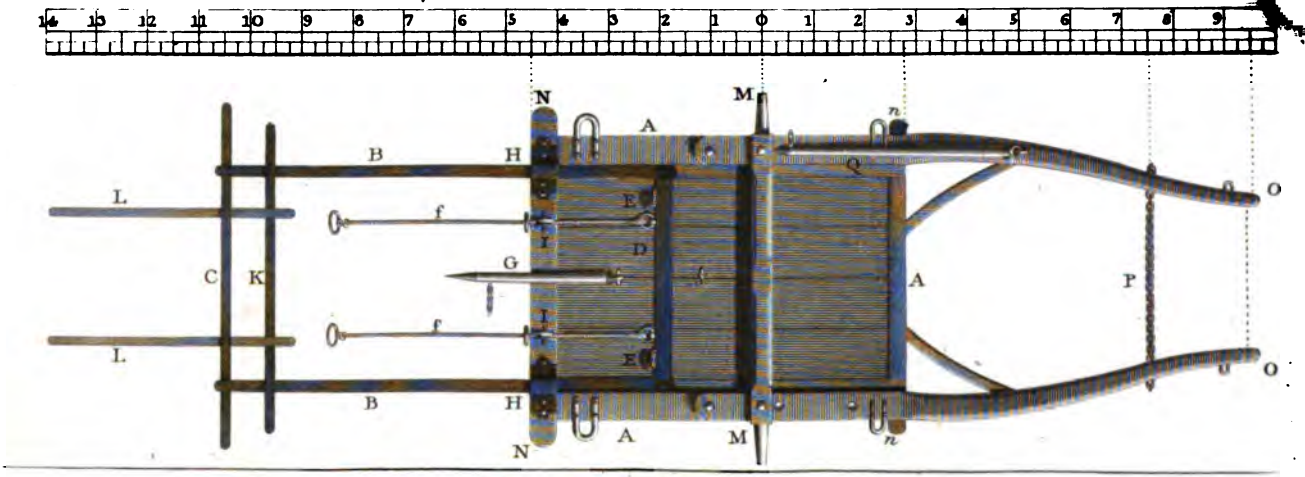
A. That side of the Oven which is placed next the fire.

B. The projecting piece of iron which remains stationary in the fire, and communicates heat to the Oven,

C. The door of the Oven,

The

M.r J.s Smart's Sliding Lever for Relief of Horses.



M.r I. Holmes's Family Oven.

Fig 1

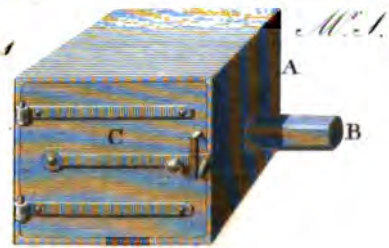
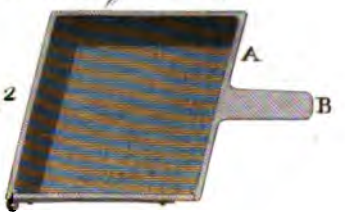


Fig 2



The Thanks of the Society were this Session voted to Mr. JOHN SNART, No. 209, Tooley-Street, London, for the following Account and Drawing of a SLIDING LEVER fixed to the under side of a Cart, for the relief of Horses when thrown down and entangled in the Thills. The Society wish, for the sake of humanity, to alleviate the cruelties to which horses are subjected, and hope the plan here given will afford a useful hint for further improvements in this line. This Machinery will also afford some advantages in loading carts, where the common length of the cart is too short for the articles intended to be carried.

DESCRIPTION *of the* SLIDING LEVER *invented by Mr.* JOHN SNART, *Optician, London, for the improvement of Carts, and relief of Horses, and which may be applied to all two-wheel Carriages. This invention he calls an* ALEXIPPOS. (See Plate II.)

A A A, plan of a common town cart inverted.

B B, Sliding bars or levers, *i. e.* the Alexippos.

C, Cross-bar, or handle of the Alexippos.

D, the connecting bar to project the Alexippos.

E E, stops, to prevent over-drawing ditto.

f f, ropes and hand-rings to project ditto, which may be put under the sliding bars B B.

G, prop to prevent hanging the horse.

H H, the bearing plates of the Alexippos.

I I, the pulleys, or shivers.

K,

K, the extra bar for country carts.
L L, the handspikes for ditto.
M M, the axle-tree, or fulcrum.
N N n n, hind and fore ear-breadths.
O O, the extremities of the shafts.
P, the back chain.
Q, the prop.

SIR,

AS all librating bodies act in an exact and direct ratio to their elongations from the fulcra, considered in connexion with their proportion of weight, and *vice versâ*, (the first resistance by the inequality of their matter being excepted), it appears, that as is the solidity of the part resting on the fulcrum, to the solidity of its extremities, so is its resistance to be acted upon by a weight which is less than its disproportion; which inequality of power is to the weight added in an inverse ratio, but directly as the diminution.

It

It is evident that the construction of carts at present is very unfavourable to the relief of the fallen horse, who is intentionally placed at the longest arm of the lever (for the shafts act as a lever by supposing the axle-tree to be the quiescent fulcrum), that he may the better resist the weight of the load, should the equilibrium be by any means destroyed; for any given weight upon the hind part of the cart has less than half the power of resistance of the horse; so that, if such horse falls, this advantage is prejudicial to his being raised. The inventor, therefore, of the Alexippos, presumes that a plan, the basis of which is humanity, will sufficiently apologize for his offering to the public an invention which so obviously more than counteracts the before-mentioned disadvantages, as may be seen by inspecting the plan in connexion with its scale.

Let A A A *(Fig. I.)* be a plan of the common town cart, whose hind carbred,

bred, or ear-breadth, N N, projects from its fulcrum, or axle-tree, M M, 4 feet 7 inches, while the back chain P is 7 feet 6 inches; and the extremes of the shafts, O O, which press upon the tuggs in the horses collar, are 9 feet 6 inches. Now, admitting that the horse who falls weighs 15 cwt. and that his bearing is 1 cwt. which is 16 cwt. it is very evident that it will require 3316 lb. weight gross at the ear-breadth N N, (which is but 4 feet 7 inches from the fulcrum M M), to counteract such a weight; even admitting that the load had not slipped forward at all by the concussion and depression of the fore parts of the cart. The estimate, therefore, now will be nearly as follows: 4 feet 7 inches, or 55 inches, to 9 feet 6 inches, or 114 inches, will give for the weight 3316 lb. which is more than that of twenty-two men, at 150 lb. weight each, before a disabled horse can be raised from the ground: but we know that six men cannot bear

their

their weight with advantage on one of our present-made carts, without endangering their persons or clothes, or both; so that the horse is left to struggle with three-fourths of the weight himself, and this in a very bad posture, as he is embarrassed by the shafts, &c. Hence, many horses, if not immediately killed, are at least ruined for ever.

The advantage of the Alexippos is in the proportion of 126 inches, the length of the levers at C, to 114 inches, the length of the shaft, viz. O O; and this without the addition of the handspikes L L, which gives a further advantage of one-fourth. Again, if 55 inches, the length of the lever, at N N, require 3316 $\frac{2}{11}$ lb. weight, what will 126 inches require? Answer, 1447 $\frac{5}{126}$ lb. which is less than the weight of ten men, at 150 lb. weight each. This, however, is not half the advantage of the Alexippos, as it affords convenient accommodation for more than twenty men, without hazard

to

to clothes or persons. And, if we suppose a sliding bar at K, one man, (if men are scarce, as in the country) by applying the two handspikes L L, may gain power sufficient to raise his horse himself, especially as it fortunately happens that country luggage very frequently consists of such articles as might be removed from the front of the cart, and placed on the bars C and K; such, for instance, as sacks of corn, seed, potatoes, bran, flour, peas, beans, &c. &c. which, by being taken from the front, and placed behind, would have more than double the advantage of its real weight; and, in town, where the luggage is different, assistance is always to be obtained from humanity.

Notwithstanding the statement of powers for relief which I have here given, it is plain, from daily observation, that less than half the power here stated is only used in general, as eight or nine men can often (though with much danger

ger and trouble) raise the fallen horse. Hence, by using the Alexippos, three or four men, without danger, delay, or trouble, will be sufficient.

I remain, SIR,

Your obedient servant,

JOHN SNART.

July, 1799.

To the SECRETARY.

A Bounty of FIFTEEN GUINEAS was this Session voted to Mr. THOMAS ARKWRIGHT, of Chorley-Moor, in Lancashire, for a DOOR or CHEST LOCK, of a peculiar construction, for securing Property from PICKLOCKS and HOUSEBREAKERS. This Lock has two Bolts so formed, that if the Key should by accident be left in the Lock, it would be scarcely probable that a Servant could unlock them. A Description and Print of the Lock are annexed; and the Lock itself is reserved in the Society's Repository, for the inspection of the Public.

DESCRIPTION of Mr. ARKWRIGHT's LOCK, PLATE III.

A. THE pointer on the shank of the key.

B. The pin on which the key turns.

C. The

C. The top-bolt of the lock.

D. The upper higher tumbler for the top bolt.

E. Another tumbler for the top-bolt, and placed underneath it.

F. A lever which works both bolts, and moves on a centre G.

H. The lower bolt, with a joint I upon its head.

K. The lower tumbler, with two joints LL, which fall into two notches of the top-bolt. Underneath the lower-bolt is another tumbler similar to that marked E.—There are five springs within the lock, four of which act upon the upper and lower tumblers, the other on the joint-bolt H.

M. The bottom part of the key. The dark ring in the centre represents the hollow to be applied to the lock pin B, above mentioned.

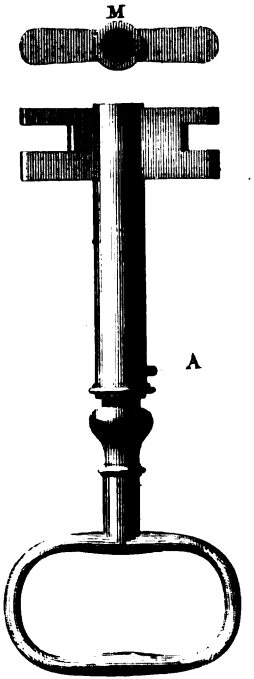
DIRECTIONS *for working the* DOUBLE-BOLTED LOCK, *invented by* Mr. THOMAS ARKWRIGHT, *of Chorley, in the County Palatine of Lancaster.*

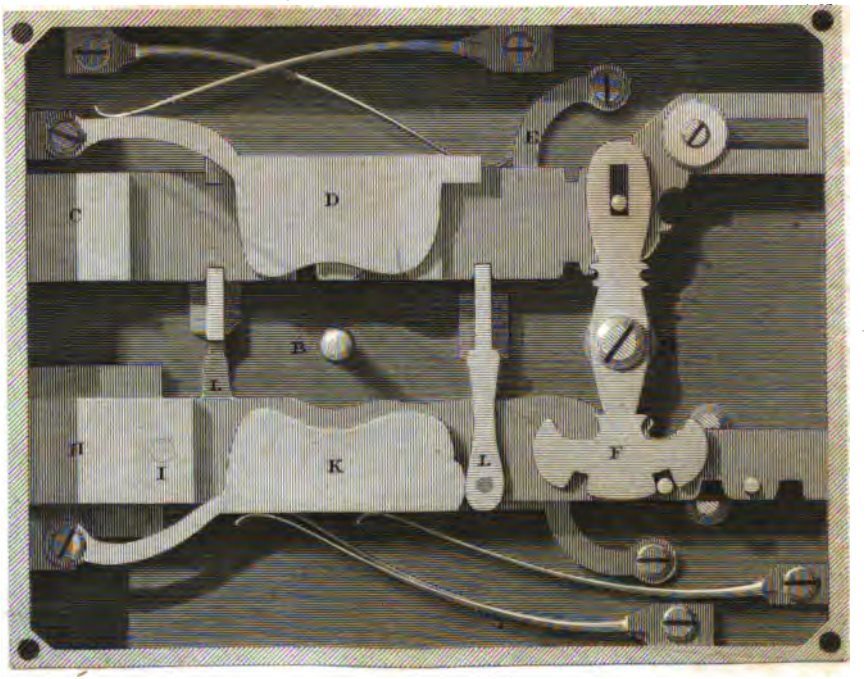
FIRST, place the head or bolts of the Lock towards the left-hand; then take the key with the right-hand, with the small pointer A, in the shank of the key towards the right: after this, put the key down to the bottom of the socket upon the centre-pin B, in the lock, and give one half-turn with the pointer, in the shank of the key, upwards; by which the bolt C at the top will be locked. In the next place, draw back the key about one inch, so that the webs or bits of the key may clear the tumblers in the lock; then turn the key with the small pointer towards the right hand, and put down the key in the manner above mentioned. After this, make one half-turn with the pointer in the

shank of the key downwards, by which mean the lower bolt H is locked, and the higher bolt C unlocked. Then draw up the key as aforesaid, and turn it with the pointer in the shank to the right hand. In the last place, thrust down the key, and give one half-turn with the pointer, in the shank of the key, upwards, by which mean both the bolts, C and H, will be locked; so that, when the bolts are to be unlocked, the pointer in the key must be towards the left hand, and must be worked as above directed.

A Bounty

Mr. Thos. Arkwright's Door Lock.





Matilda Lowry del.

Lowry sculp

A Bounty of TEN GUINEAS was this Session voted to Mr. WILLIAM BULLOCK, No. 6, Portland-Street, Soho, for a LEVER LOCK-BOLT for FOLDING-DOORS, by means of which the upper and lower Bolts are withdrawn with ease by the turn of a common Door-handle, and the same Bolts shot and fastened merely by pressing the Door to its proper place. The following Letter was received from him, and an elegant Model of this Invention is left in the Repository of the Society.

SIR,

I SEND with this, for the inspection of your Society, the working part of a Rack or Lever-bolt, which prevents the bolts from becoming stiff by rust.

From the benevolence of the Society to me in 1797, for my Reliever for a

Rack-bolt, I was induced to make further trials to bring it to perfection.

I believe the method now produced will answer every purpose that can be desired, as it works very easy; is not liable to want repair, nor to be much, if any, injured by rust. I have lately made, and tried several, which answer very well, which induces me to lay this method before the Society, as an improvement in the machinery of a Rack-bolt, or, more properly, of a Lever-bolt.

I remain with respect, SIR,

Your humble Servant,

WILLIAM BULLOCK.

No. 6, *Portland-Street, Soho,*
March 25, 1800.

Mr. TAYLOR.

DESCRIPTION

Description of Mr. William Bullock's Lever Lock-Bolt.

THE handle, in external appearance, resembles the round door-handles in general use; when moved, it acts in a double chain fallow: the lower chain communicates with a lever which has a pivot near its centre, the extremity of which lever raises up the lower bolt of the door when shut; the upper chain communicates with another lever, connected with the upper bolt, which it draws down by moving on a pivot near the centre of the lever; and thus the bolts are opened. The upper bolt being stopped down by a reliever at the top of the door, the bolts are prevented from grating either at the top or bottom of the door. On shutting the door, the reliever is pressed in by the wood-work at the top of the door, which sets the bolts at liberty; the lower bolt then falls down,

and the upper bolt is propelled by two springs which act upon the upper and lower levers, and the door remains firmly bolted.

A great advantage arises in the use of this invention, from the whole of the machinery acting upon pivots, which are not liable to rust, but allow a regular and easy motion to the bolts.

The

The GOLD MEDAL, or THIRTY GUINEAS, at the option of the Candidate, was this Session adjudged to Mr. GEORGE DAVIS, as a Bounty for his Invention for preventing Passengers in Carriages being injured when the Horses have taken fright; from whom the following Account and Certificate were received, and who made choice of the pecuniary Reward. A Model of this Machine may be seen in the Repository of the Society.

SIR,

I HAD the honour some months ago of giving in a claim for the Premium offered by the Society to any person who should invent a method of "Extricating Horses from a Carriage, to prevent Passengers from being injured;" but not having *then* brought it to that

perfection I could have wished, I informed the late worthy Secretary, Mr. More, that I should withdraw the claim for that Session. It is now completed, and ready for any inspection or trial before mechanical men, that the Society may judge expedient; and I therefore renew my application for the Premium.

Having affixed the apparatus to a coach, I should conceive it would not be necessary to enter into a very particular description of it. I shall therefore only relate the manner of operation.

" It is fixed behind the splinter-bar, and the communication, by means of a copper chain, is carried through the boot to the side of the coach-box, that, in case of the horses taking fright, or, of that more fatal accident, the reins breaking, which precludes the possibility of stopping the horses, the coachman can discharge them instantaneously." There is this superiority in my invention, over any other method hitherto put in practice,

tice, "That the horses can be liberated, even when the pole is at right angles, or locked close to the perch, a position which otherwise overturns a carriage." I have had the honour of exhibiting a trial before His Majesty, and discharged the horses three times; which Mr. Vidler, of Millbank, can attest, having been present on the spot, and who was pleased to say, that he thought, if it was more generally known, no carriage would be without it.

I am, SIR,

Your obedient humble servant,

The CANDIDATE.

Nov. 13, 1799.

To the Secretary of the
Society of Arts, &c.

SIR,

SIR,

BEING informed that Mr. George Davis, of Windsor, has put in a claim for the Premium offered by the Society for releasing four horses from a carriage when in full speed, I have the pleasure of informing you, that I saw it performed three times before His Majesty in Windsor Great-Park, on the fourth day of March, 1799; when it fully answered every purpose for which it was intended; and, in my humble opinion, may be applied to carriages in general, and does much credit to the inventor as a mechanic.

I am, SIR,

Your humble servant,

J. VIDLER.

Millbank Factory,
Millbank-Row, Westminster.

To the Secretary of the
Society of Arts, &c.

The

THE Committee of Mechanicks, to whose consideration this business was referred by the Society, appointed a trial to be made near the Magazine in Hyde-Park, on Thursday the twenty-seventh of March, 1800, with a coach, to which the apparatus was attached. Four horses and two postillions were employed for the purpose. A person sitting on the coach-box loosed the pole and rollers from the carriage, by pulling a chain placed near the boot, which chain drew back the bolts in the splinter-bar, and allowed the pole and rollers to be carried off by the horses, at a time when they were galloping at the rate of more than ten miles an hour. The experiment was repeated thrice, and the horses disengaged each time; but the impetus given to the carriage by the velocity of the horses, occasioning the coach to run forwards above twenty yards on level ground, after the horses were detached, the Committee were of opinion, that a part, but not

not the whole of the object of the Society was answered, as the passengers in the carriage might yet suffer injury from the motion of the carriage after the horses were liberated. On their noticing this circumstance to Mr. Davis, and a gripe being added to stop the motion of the wheels, Mr. Davis, on the eighth of May last, produced the present ingenious invention to the Committee; by means of which, at one pull of the chain, the horses may be liberated, and two bolts propelled on the nave of the two fore-wheels, so as to retard their motion. For this invention and apparatus, a Bounty of Thirty Guineas was awarded and paid to Mr. Davis from the Society.

Description of Mr. Davis's Model, Plate IV.

Fig. 1. A, the splinter-bar of a carriage, to which the horses are attached by

by the traces fixed to the rollers BBBB, and to the pole C.

D, a brass chain extending from the coach-box to the splinter-bar: this chain goes under the roller E, over the roller F, is then wound once round the pulley G, and thence directed by the small rollers H and I to the quadrant K, to the furthest extremity of which it is attached.

The quadrant K has a vertical axis, on the upper part of which is a pinion with four teeth, (see L, *Fig.* 2 and 3). This pinion works in two racks, MM, fixed on two elbow head bolt-bars, NN; and, by means of these racks, the bolts are moved backwards and forwards by the action of the quadrant K.

These bolt-bars extend from the centre of the splinter-bar to its extremity, the strait end of the bolts shooting into the rollers BB, *Fig.* 1. at the end of the splinter-bar, and the elbow-heads, *n n*, shooting into the two centre rollers B B.

On

On the lower part of the axis of the quadrant K is a female screw, which receives a bolt O, (see *Fig.* 3). one end of which, when bolted, passes through the bolt C: the other end of it is a male screw.

P Q are two collars fixed on the splinter-bar, which collars confine the axis, and prevent its being displaced.

Fig. 4. shows the pulley G, round which the chain D passes: the axis of this pulley contains two female screws, R S, with threads in different directions moving the two bars T V, backwards or forwards, so as to protrude them on the conical part of the naves of the fore-wheels of the carriage, and to act as a brace thereon, so as to retard their motion.

Fig. 5. is a link of the chain, in order to show its make or formation.

When the horses are to be detached, and the carriage stopped, the coachman, sitting on the coach-box, draws up

up a handle W, *Fig.* 1. affixed to the chain D by means of an iron bolt with a spring upon it, to retain it when drawn out: the chain D pulls back the quadrant K, and draws back the double bolts N N, which pass through square holes at the lower end of the rollers B. The same motion of the quadrant, by means of its female screw, raises the screw-bolt O, and sets the pole at liberty; so that the horses move off with the pole and rollers. It has been before observed, that the chain D winds once round the pulley G; by this means, when the chain is drawing up to detach the horses, the motion of the pulley propels, from its female screw on each side, bolts which have screw-heads at one end, and wedges at the other, which wedges, when propelled, act as braces on the conical-formed naves of the fore-wheels, and stop the motion of the fore-wheels.

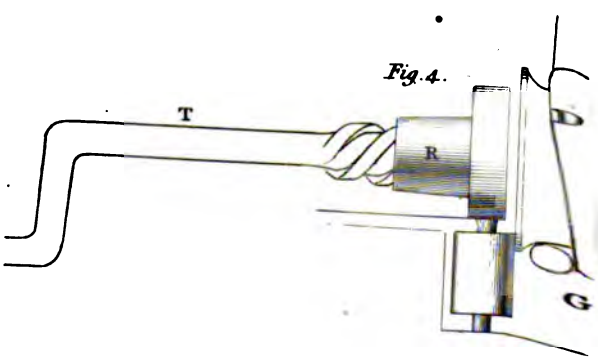
X is a square head on the axis of the quadrant K: by means of a key applied

applied on this head, when necessary to attach the horses to the carriage, the quadrant is returned to its place, and bolts the rollers and pole, after they are replaced in their proper situations; the quadrant at the same time pulls back the chain on the pulley G, which pulley draws back the wedge-bolts from the conical naves of the fore-wheels, and sets them free to move.

A Bounty

Mr. Ge. IV.

Fig. 4.



PAPER

IN

MANUFACTURES.

S

MANUFACTURES.

A Bounty of FIFTEEN GUINEAS was this Session voted to Mr. THOMAS CLULOW, No. 31, Old Cock-Lane, Shoreditch, for his Invention of a LOOM to weave FIGURED RIBBANDS, a Model of which is reserved in the Society's Repository, for the inspection of the Public.

THIS Loom differs from the common figured Ribband-Looms in the method of forming the figure, which, in the old mode, was tedious, from the work being stopped, whilst the figure was drawn by the hand.

In the present Loom the tire cords, which form the figure, are drawn or

worked by a cord or leather strap fixed to the centre traddle, which strap passes over two vertical and one horizontal pulley to the back of the loom, and has a weight hung to the end thereof: upon this strap, above the weight, is fixed an iron of a bevil or sloping form, which, when the strap is pulled up by pressing with the foot upon the traddle, raises a wire lever placed across the main wheel of the movements placed vertically, and allows this main wheel to move one fourth of its circumference, where it is stopped by an iron pin placed on its rim, and prevented from returning by a clitch or catch on the edge of the wheel on its right-side. Within the rim of the main wheel is a small catch-strap connected with the strap above mentioned; this catch-strap pulls forward the main wheel one fourth of its circumference until it is stopped by the wire-lever, and one of the pins on the rim, of which there are four in number in the round.

There

There are also four iron pins projecting from the left side of the main wheel in opposite quarters of it; these act on a hanging lever, to the lower part of which a string is attached which passes behind the box, containing the whole machinery, and raises four clicks or catches on four rollers, which permits any one of the four rollers to run back as the figure may require, each roller, by such motion, drawing up the number of threads necessary to form the figure, by cords extending from these rollers over pulleys to the pass-cords which draw the figure.

PAPER

IN

NAVIGATION AND COMMERCE.

NAVIGATION AND COMMERCE.

The Thanks of the Society were this Session voted to the Rev. FRANCIS H. EGERTON, of Bridgewater-house, for the following Communication relative to an UNDER-GROUND INCLINED PLANE, executed at Walkden-Moor, in Lancashire, by his Grace the DUKE OF BRIDGEWATER, to whom the GOLD MEDAL was voted, as a testimony of the high opinion entertained by the Society of his Grace's execution of this great work, and his wonderful exertions in Inland Navigation.

I BEG leave to present to the Society an account of the Under-ground inclined Plane, which the Duke of Bridgewater has lately made at Walkden-Moor, between Worsley and Bolton, in Lancashire,

shire. To this account I have subjoined two plans, with a table of reference to each.

At Worsley the Duke of Bridgewater's navigation begins; it goes west to Leigh, and east to Manchester, where it locks up into the Rochdale canal. In its way to Manchester, it turns out, in a western direction, near Longford Bridge, to meet the Grand Trunk Canal, above Preston Brook; and from thence it goes north-west to Runcorn, where it locks down into the Mersey, in the tide-way to Liverpool.

To this navigation above-ground, which, in all its directions, is extended through a length of * forty miles, upon one

* *Forty miles upon one level.*] Adding to these forty miles, nearly twelve miles of the Duke of Bridgewater's Underground Navigable Canal, which lie upon his lower main level, and including eighteen miles of the Grand Trunk Canal betwixt the lowest lock between Middlewich and Preston-Brook, there are seventy miles of navigable canal, without a lock, upon one level, eighty-two feet above low-water mark; whereby a communication is obtained between London, Liverpool, Bristol, and Hull. At this lowest lock the Grand Trunk Navigation locks down, to be upon a level with the Duke of Bridgewater's.

one level, without tunnel or lock, except the locks at the extremities. At Worsley, an under-ground navigation is joined, which goes to the different mines of coal under Walkden-Moor; from which mines, by these navigations above-ground and under-ground, Manchester and various other places are supplied with that valuable article.

The canals of this under-ground navigation lie upon two levels, or stories.

The lower is upon the same level with the open navigation, which it joins at Worsley; and consists, in the different lines which it pursues to the different seams of coal, of near twelve miles of tunnelling.

The higher is thirty-five yards and a half perpendicular height above the level of the lower, and varies from thirty-eight to sixty-one perpendicular yards below the surface of the earth, and consists of near six miles of tunnelling.

The

The tunnelling of each level is ten feet four inches wide, and eight feet six inches deep; and the depth of water, three feet seven inches.

Before a communication was made by an inclined plane, the coals were discharged by hand from the boats on the higher level, and were let down the pits in tubs by an engine and a break-wheel into those upon the lower. To convey the boats themselves from the canals of the higher level into that of the lower, was the intent of making this underground inclined plane. By the help of this machinery, the whole business is now done at once, without discharging or damaging the coal, and at one fourth of the expence: for the boats of the higher level are bodily let down the inclined plane, and are floated from the foot of it through nearly three miles, in a strait line, of the lower level canal, into the open navigation at Worsley: and, whereas they were before obliged

to

to be drawn up to the surface of the earth at great inconvenience and expence, to be repaired at a work-shop on Walkden-Moor, they now come of themselves, in their course of business, to be repaired at the great dock-yard at Worsley.

The place where the inclined plane is constructed, is adapted in a singular way for the purpose. There is a bed of white rock, or grit, eight yards twelve inches deep, which dips one in four, lying exactly in the direction most convenient for the communication between the two levels; which bed of rock is hollowed into a tunnel, driven upon the rise of the metals, by blasting with gunpowder, and working it down with wedges and hammers. In this tunnel, formed through a rock reaching from the lower to the higher level, the inclined plane is fixed; and, by its being in the heart of a rock, the whole workmanship can be pinned, secured, and compacted together

together at the top, bottom, and sides, most effectually:—an advantage which no inclined plane above-ground can have, and which renders this a singular production, no where perhaps to be imitated.

The run of the inclined plane is one hundred and fifty-one yards, besides eighteen yards, the length of the locks, at the north or upper end: and the fall is one in four, corresponding with the dip of the rock.

Of these one hundred and fifty-one yards, about ninety-four yards are formed into a double waggon-way, in order to let two boats, namely, the empty and the loaded boat, pass up and down; and are divided by a brick wall, supporting the roof, in which are openings for a person to escape out of the way of the boats; which double waggon-way joins in one, about fifty-seven yards from the lower level.

The

The whole width of the double waggon-way is nineteen feet; and of the single waggon-way, after the junction, ten feet.

These waggon-ways are supplied with iron rails, or gullies, laid on sleepers, down the whole run; and the height of the roof, above the iron rails, is eight feet.

At the top of the inclined plane there is a double lock, or rather two locks, side by side, formed in the heart of the same rock, which deliver the loaded boats from the higher level down the inclined plane, and receive the empty boats from the lower. The length of that part of the tunnel in which these are formed, is eighteen yards; the width or diameter, twenty feet six inches; and the height of the roof, at the north end and above the locks, at *d d*, *Plate V. Fig.* 1. twenty-one feet, to admit the break-wheel.

The

The bottom, or south end of the inclined plane, is six feet nine inches under the surface of the water, where the loaded boat floats off the carriage upon the canal of the lower level.

The depth of the locks, under water, at the north end, is four feet six inches; at the south end it is eight feet.

The wall between the locks is nine inches above the surface of the level water; its breadth is three feet.

The diameter of the horizontal main-shaft, upon which the rope works to let the loaded boats down, and to draw the empty boats up, is four feet eleven inches, and its circumference is fifteen feet five inches. The main-rope is two inches and a half in diameter, and seven inches and a half in circumference. It is lapped round with a small cord of about an inch in circumference, for the length of about one hundred and five yards, to prevent its wearing, which it does chiefly when it drags upon the bottom,

tom, when at work, at the place where the waggon-ways unite; and, for the same purpose, rollers of eight inches diameter are fixed at intervals down the run of the inclined plane. Moreover, a hollow cast-iron roller of eight inches and a half diameter is fixed across the west lock, parallel to the upper west lock-gate, and near the north end of the lock, but half a yard higher than the gate, in order to bear up the rope, and to prevent it from swagging.

A hold-fast rope is fastened to the main-rope, to stay each boat upon its waggon, as they go up or down. It is marked *k k*, in *Fig.* 1, *Plate V.* and its uses are more particularly detailed in the table of reference, at *k k*, to that plate.

Upon this horizontal main-shaft is a break-wheel above mentioned, which regulates the motion of the loaded boat going down the inclined plane.

The number of iron teeth, or cogs, in the spur-wheel, which is fastened to the

side of the break-wheel, is three hundred and seventy-two; and the little nut-wheel, *No.* 3, *Fig. II.* which sets it in motion, contains eleven teeth, or cogs. The nut-wheel is supported by two uprights from the pillar to the roof, and works between them. Two winches or handles, *No.* 4 4, *Fig. II.* on its axis, put the main-shaft, *d d*, *Fig. I.* or *No.* 1, *Fig. II.* in motion. The power of both united enables a man, who uses a force equal to forty pounds weight, to set forward two tons upon the waggon-road: and this force, multiplied at the winches or handles, may be used to set forward the loaded boat out of one lock, and to bring the empty boat into the other. The boats being thus put in motion, the little nut-wheel is disengaged from the main-shaft, by a slide drawing the little nut sideways, so as to disengage the teeth, or cogs, from the cogs of the spur-wheel. The weight of four tons going down bring up about one.

The

The spur-wheel, however, which is fastened to the break-wheel, *No. 2, Fig. II.* is seldom used, as it is occasionally only put in motion to regulate the stretch of the ropes when new, and to draw the light boat into the lock, when, at any time, it may happen to be over-weighted with materials, such as mortar, props, slabs, &c. for the use of the higher level collieries, and will not move of itself, upon a balance, out of the lower level.

The length of the carriage, or cradle, is thirty feet; its width is seven feet four inches. It moves upon four solid cast-iron rollers, which run upon cast-iron plates; on one side of each of which there are iron crests, which stand two inches higher than the plates, and prevent the carriage from running off the road.

The weight of neat coal, contained in the loaded boat, is about twelve tons: the boat weighs about four tons; and

the carriage, or cradle, in which the boat is placed, when conveyed down the inclined plane, is about five tons:—in all about twenty-one tons.

At this inclined plane thirty loaded boats are now let down, with ease, in about eight hours; that is to say, four boats are let down in a little more than an hour. The boats used in these collieries are of different sizes and dimensions; some will carry seven, some eight and a half, some twelve tons.

The weight of neat coal, independently of the weight of the carriage and boats which is let down the inclined plane, in twelve-ton boats, in eight hours, will consequently be three hundred and sixty tons. The weight of the carriage, suppose five tons, let down in the same time, will be one hundred and fifty tons; and the weight of the boat, suppose four tons, thirty times down, in eight hours, will be one hundred and twenty tons:—in all six hundred and thirty tons down in eight hours.

The

The weight of the carriage thirty times up, and thirty boats up, in eight hours, will be

Carriage, at 5 tons, 30 times up = 150 tons
Boat, at 4 tons, 30 times up = 120 tons

In all 270 tons up in eight hours.

So that there will be 630 tons down
270 tons up

In all 900 tons moved at the inclined plane, in 8 hours, exclusive of an indeterminate quantity of materials occasionally brought up for the use of the higher level collieries.

The various feeders which are loosened by opening the coals in the higher level collieries, as well as three sufficient re-

 servoirs,

servoirs, which may occasionally be resorted to, and used in a dry season, keep the higher level always to its height, and afford a constant supply of water to fill the locks, for the purpose of working the inclined plane.

This inclined plane was begun in September, 1795; it was finished, and in use, in October, 1797.

Of this, as of most of his other great works, the Duke of Bridgewater was himself the planner and contriver:—to project greatly, and to execute completely, are the perfection of genius.

The singularity of the place in which it is constructed; the original boldness of the design; the ingenuity and mechanism displayed in planning and executing it; the dispatch with which it has been finished; the simplicity, beauty, and harmony of its parts, tending to one united whole; and, above all, the perfection to which it is proved to have been brought, now that it is practically in use; render it

it equally astonishing with any other of the stupendous works which have been so ably planned, and so successfully executed, by the first projector and patriotic father of Inland Navigation.

I have the honour to be, &c.

FRANCIS H. EGERTON.

Bridgewater-House,
March 5, 1800.

REFERENCE *to Plate V. being a Plan and Section of his Grace the* DUKE OF BRIDGEWATER'S *Under-ground Inclined Plane, at Walkden-Moor Colliery, near Worsley, in Lancashire.*

Figure 1.

a to *b*, Dip of the metals and waggon-road on the under-ground inclined plane. From *b*, on the lower level, to the mouth of the tunnel, is three miles.

A, The east lock.

B, The west lock.

C, Represents a section of the lock: the dotted line shows the horizontal depth, and the black line under it, the slope upon which the waggon-wheels run to receive the loaded boat, or to bring the empty boat into the lock.

d d, The main-shaft, four feet eleven inches diameter, upon which the ropes work to wind the boats up and down; and here also the break-wheel is fastened on,

on, together with a spur-wheel, and a nut-wheel. See *Fig. II. No.* 1.

e, A passage betwixt the higher level and the locks.

f f, A loaded boat going down, and an empty boat going up the under-ground inclined plane.

G, A brick wall from the sole to the top of the inclined plane, in order to give additional support to the roof.

h h h h, Openings through the brick wall *G*, into which a person may step out of the way of the boats, at the time they are passing up and down.

i, A bell, which is rung by the rope dotted to *b*, upon the lower level, at the bottom of the under-ground inclined plane, to give notice when the empty boat is upon the waggon, or cradle, and when the men below are ready, that the loaded boat may be let down by the men above.

k k, Holdfast-ropes fastened to the main-ropes, and hooked on to a ring at the south end of each boat, as it goes up or down, in order to stay the boats upon the

the waggon or cradle, that they may not swag, or slip off. These holdfast-ropes are spliced on to the end of the main-ropes, and run above and between the two bridle-ropes when they are fastened to the iron uprights, which are upon each side of the waggons, or cradles; and they run over the north end of the boat, to be hooked on to the south end.

l l, The bridle-ropes fastened to the main-ropes at *O*, and secured to two iron uprights upon each side of the waggon, or cradle.

O O, The places where the main-ropes, the bridle-ropes, and the holdfast-ropes, are fastened all together.

No. 1. An open space driven into the side of the lock *A*, to which a pit is sunk from the higher level, in order to convey the water out of the locks down to the lower level, and also to force a current of fresh air into the lower level collieries.

No. 2. A paddle to let the water out of the lock *A*, into the pit *No.* 1.

No.

No. 3. A paddle to let the water out of the lock *B*, through a culvert, represented by dotted lines, under the lock *A*, into the pit *No.* 1.

No. 7, 7. Paddles in the lock-gates, to let the water out of the higher level into the locks.

No. 8, 8. The two north lock-gates, one to each lock, which turn upon the heels of the gates, and swing round when they are opened or shut.

No. 10, 10. Two stops or cloughs, one to each lock, which serve as lock-gates to the south end, and are raised and let down by a windlass.

S, A stop, which is used occasionally when the lock-gates want repairing.

T, The place where the boats which are to pass to or from the lower single waggon-way are directed, at pleasure, into either part of the double waggon-way, by a moveable iron sleeper or plate at that point, upon which sleeper or plate the wheels of the boat-carriage or cradle run.

TABLE

TABLE *of* REFERENCE *to Plate V. Fig. 2, of his Grace the* DUKE OF BRIDGEWATER'S *Under-ground Inclined Plane, at Walkden-Moor Colliery, near Worsley, in Lancashire.*

1. Main-shaft, on which the rope laps.

2. Break-wheel, on one side of which the spur-wheel is fastened.

3. Nut-wheel, out of geer, but which slides into the spur-wheel, when used to draw the empty boat into the lock occasionally, and which is supported by two uprights from the pillar to the roof.

4, 4. Winches or handles, to work the nut and spur-wheel.

5, 5. The main-ropes fastened to the boats, and which are lapped to prevent their wearing.

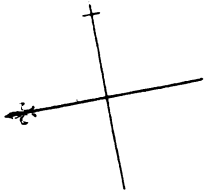
6. The spur-wheel, which is fastened on one side of the break-wheel; and on which break-wheel is a strong iron-jointed timber brace, which, according to the pressure

pressure given thereto by the man who attends it, will allow the loaded boat to descend quick or slow, or detain it in its passage.

7, 7. Paddles in the lock-gates, to let the water out of the higher level into the lock.

8. A hollow cast-iron roller, to prevent the main-ropes from swagging.

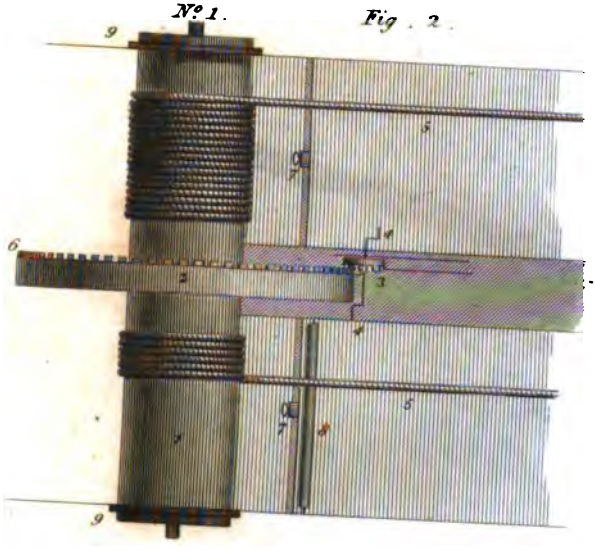
9. Shroud-wheel, to prevent the ropes going over the end of the main-shaft, slipping off, jerking, or breaking. This stands three inches above the main-shaft.

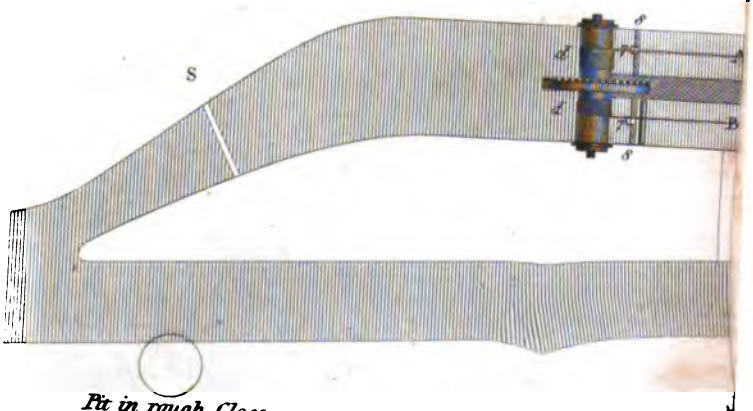


Surface of the Water in the high

a

No. 1. Fig. 2.





Fit in rough Close

PAPER

IN

COLONIES AND TRADE.

COLONIES AND TRADE.

The GOLD MEDAL, being the Premium offered by the Society, in 1792, to the person who should first discover a PASSAGE by LAND from the North-West parts of Upper Canada to the South Sea, between Nootka Sound and the Straits of Kamschatka, or to the navigable part of any River that disembogues itself into the South Sea, within those limits, was this Session adjudged to ALEXANDER MACKENZIE, Esq. in consequence of the following Accounts and Certificates.

SIR,

AGREEABLY to your Excellency's request, I beg leave to acquaint you, that on the 9th of May, 1793, I, in a bark-canoe, left one of our settlements in the North-West, on the Unjegah or Peace River, latitude 56° 9′ North,

and longitude 117° 43′ West from Greenwich, for the purpose of penetrating to the Western Ocean. I followed up the waters of this river to their source, and carried my canoe over the height of land, which is only seven hundred yards; from thence I continued my route down a small river, which I found to discharge itself into the branch of a large one, which the natives call Tacoutch Tesse, or Tacoutch River. We were carried down this river by the strength of the current with great velocity. I found that it took too much of a southern course to bring me to the sea so soon as I intended; and, from the best information I could procure, I judged that it did not discharge itself to the northward of the river of the West, a branch of which, if not the whole of that river, I conceive it to be. Though I was sensible that this was the best, but not the shortest communication with the sea, circumstances would not admit of my taking it; therefore I returned up the river

river five days journey, then left my canoe, and such part of her lading as we could not carry with us, in latitude 53° North, and longitude 122° 43′ West. After travelling fifteen days, I arrived at the Western Ocean.

The sea along the coast being much interspersed with islands, I borrowed a canoe, and went out amongst them about twenty leagues. I found myself to be in Middleton Sound, in latitude 52° 23′ North, and longitude 128° 15′ West; from which place I commenced my return the 23d of July, by the same road which I had passed, and arrived safe with my people, on the 24th of August, at the place from whence I had taken my departure.

I have the honour to be, with respect,

Your EXCELLENCY'S

Most obedient humble servant,

ALEXANDER MACKENZIE.

Hind's Tavern,
Sept. 10, 1794.

His Excellency Governor SIMCOE.

Extract of a Letter from Governor SIMCOE *to* WILLIAM WALCOT, *Esq. of the Inner Temple, dated Sept.* 13, 1794.

I PARTICULARLY address myself now to you, inclosing Mr. Mackenzie's letter to me, and desiring you to call on Mr. More with it, and offer my best regards. You will be so good as to make with him any further arrangements necessary for me to certify, that Mr. Mackenzie has penetrated to the Pacific. He is "open, bold, and brave."

SIR,

UPON inquiry about the Certificate necessary to show the Society that Mr. Mackenzie did perform the journey that entitles him to the Gold Medal, voted by them, I have to inform you, that

that General Simcoe (who is at present in town) will satisfy every doubt that can arise on that head; as I understand that the General, some time ago, presented Mr. Mackenzie with a piece of plate, with an inscription suitable to the occasion, as a testimony of regard and admiration of his spirited enterprise. If any further proof is wanting, a reference to Lord Grenville and Earl Spencer, with whom Mr. Mackenzie had an interview, will put the matter entirely out of doubt.

I am,

Dear SIR,

Your most obedient servant,

PAT. SMALL.

Arundel-Street,
April 15, 1800.

To JOSEPH COLEN, Esq.
New Inn, late Governor
of York Fort, Hudson's
Bay.

U 2 SIR,

SIR,

I HAVE formerly taken steps to certify to the Society instituted for the Encouragement of Arts, Manufactures, and Commerce, that, during my administration of the Government of Upper Canada, Mr. Mackenzie, of the North-West Company, had passed from Upper Canada to the sea-coast of the Northern Pacific Ocean, and thereby fulfilled the terms on which the Society were pleased to offer a Medal, for the encouragement of this arduous undertaking. I take the liberty, at present, in order to substantiate the claim of Mr. Mackenzie, as far as in me lies, to desire that you will be pleased to inform me if any further means may be necessary for that purpose.

I have the honour to be, SIR,

Your most obedient servant,

J. G. SIMCOE,

Late Lieut.-Gov. of Upper Canada.

London, April 28, 1800.

To Mr. CHARLES TAYLOR.

THE Society are informed, that a particular Account of Mr. Mackenzie's interesting Journey will soon be published. A Map of Canada, on which this route is delineated, has been presented to the Society by Governor Colen.

ADDITIONS

IN

AGRICULTURE.

ADDITIONS IN AGRICULTURE.

The Thanks of the Society were this Session voted to THOMAS SKIP DYOT BUCKNALL, Esq. M. P. for the following Communication relative to the causes of BLIGHT ON FRUIT-TREES, and to the methods of producing good and certain Crops of Fruit; being a supplementary paper to various letters on Orcharding and Blight, already inserted in several volumes of the Socciety's Transactions. Mr. Bucknall has given a fresh instance of his good intentions towards the Society, by the present of an engraved Plate annexed, describing three niduses of Insects; the mode he recommeds of planting dwarf and standard Fruit-trees; and a ground plan of Mr. Lake's Orchard, noted in page 96, which was laid out under Mr. Bucknall's direction.

DEAR

DEAR SIR,

I HAVE read over your observations on Blight with great pleasure; and I do not feel that I have any thing to add, except that much may be done by choosing fruits whose blossoms are patient of cold and wet, as well as of heat; and such, I know, may and will be obtained from seed. I have now among my new fruits some whose blossoms are so tender, that every one will fall with a degree of cold that will not be fatal to a single blossom of an adjoining tree. I do not attribute this solely to any defect in the blossom of the one, or to the perfection of the other, nor to want of health; but I have good reason to believe, that the same degree of cold which will suspend the progress of vegetation in one plant (and, of course, in every graft taken from it), and paralyse all its powers, will have no sensible action on another. Health, I admit,

mit, will do much, and youth (or young variety) will, I think, do more; for I see many of my new fruits, which bore heavily last year, prepare to blossom again with vigour this year: but much will still depend on the varieties being naturally patient of cold, &c. Last year I had frequent occasion to observe, during the autumn, that the same crop of fruit which totally suspends the growth of a grafted tree of a middle-aged variety, will scarcely affect that of one whose parent stock has but just obtained the bearing age.—When you reprint your Orchardist, I shall have great pleasure, if I can send you any thing worth adding to it. It is my intention to pay much regard to the progress and suspension of the sap in changeable weather next spring; and something may possibly occur that I may think worth sending you. I am about publishing a second edition of my Treatise, much enlarged; but I have

have not yet found industry sufficient to complete it.

Yours sincerely,

THOMAS ANDREW KNIGHT.

Elton,
June 3, 1800.

To T. S. D. BUCKNALL, Esq.

SIR,

UNDER the Classes 80 to 83, in the 17th volume of your Transactions, very handsome Premiums are offered for preventing Blight on Fruit-trees, or taking off their ill effects. Having long attended to the subject, and being anxious to gain further information, I dedicated my time, during the month of September, 1797, to a tour through the Cider-countries; also during the greater part of June and July, 1798, and August, September, and October, 1799; choosing to

to vary the months in each year, for more full information on the subject: and I beg this may be considered as a further attempt to ascertain the causes of Blight, and trace the most effectual means of preventing or taking off its ill effects, and in part disposing the trees to produce a small valuable crop of fruit nearly each year, instead of suffering what in the Cider-countries is called a *hitt*, which generally happens once, twice, or thrice in nine years. This hitt, or superabundance of fruit, is very destructive to the trees; for so great a crop weakens them very much, filling the stores with fruit and liquor to an extent far exceeding the stock of casks and cellar-room, so as to confound the grower, lessen the value of the property, and intoxicate the country.

This evil is noticed by Billingsly in his report for the county of Somerset, wherein he says, many sensible men are of opinion, that Cidering to any great extent

tent wastes the land, and is detrimental to the country. I, who choose to take the other side, aver that a fifth part of the land now appropiated to orcharding, were it judiciously managed, would produce to the country more value in money than all the present plantations, and make that business a real source of riches to the nation. Should a few ingenious men, in good situations, turn their thoughts to Cider-making, choose those new varieties which are known to possess superior qualities, and make Cider an article of trade to the West Indies, the Orchards would have a very different appearance from the present. It would be very easy to give a stronger body to the Cider, so as to bear exportation, merely by a process on the juice of the apple.

The Orchardist had sufficient rules for general practice as to the management of Fruit-trees, at the close of the Paper in the 14th volume, had not Blight, and the natural

natural effects of the different varieties of the Cider-fruits been started, which led me to think it necessary to improve the work, by adding a Paper, in the 17th volume of the Transactions; and I now beg your indulgence for the following remarks

On Blight.

This being intimately connected with my favoutite object, the improvement of Fruit-trees, I shall submit to your observations a further collection of facts, which I think will tend considerably to lessen, if not in part eradicate, this growing evil.

Blight originates from many causes; several of which I have pointed out before, each requiring a different description and mode of treatment, according as it arises from the air, soil, water, heat, extraneous vegetation, accidents, or insects. I shall therefore treat of Blight under these different heads.

A free circulation of air is essentially important to secure the health of the tree; indeed there can be no good vegetation without it.

Absorption and emission of air are well known to take place throughout the vegetable system for its support; and where circulation is impeded by a multitude of branches, or by trees standing too close together, Blight is the inevitable consequence. This, therefore, may be prevented, by clearing away the clustering branches long before they may have so far encumbered the trees as to give them a disposition to blight, as I have remarked in the first paper on pruning:

"Consider whether a branch will be in the way three years hence; if it will, the sooner it is taken off the better."—Eleventh Volume, p. 18.

Mr. William Lake has observed to me that Fruit-trees should be left with one aspiring top, which tends, where pruning is neglected, to keep the branches more equally

equally asunder. Remember, no leading branch is ever to be shortened, except to improve the figure of the tree; in which case it is to be cut close to the separation.

When the branches or trees are so close together as to prevent a free and active circulation of air and sun, the encumbered parts soon decline in growth, and the due flow of the sap is obstructed, the wood grows torpid, rots, dies, and falls off. When this happens, the grass beneath ceases to grow; a cold, damp, offensive smell arises; few blossoms are formed on those parts of the tree, and those never duly impregnated; consequently, the branches become unproductive, and are justly said to blight.

Now, to place this evil in its true light, I wish I might be allowed to use the word pulsation; for, in a healthy tree, when the sap flows, there is a regular irritation or motion, which impels it forward: the organization of this func-

tion, being very delicate, is easily destroyed; and there is no other way of removing the evil than by cutting off the torpid branches, and clearing away whatever may obstruct the sun and air; and, in general, if the habit of the tree be healthy, these parts will recover.—'Remove the cause, and the effect ceases.'—This I noted in the 14th volume of the Transactions, and in the Orchardist.

The soil is another most material object of attention in the management of Fruit-trees, on which I shall only observe, that if the soil is replete with mineral particles, they may occasion blight by obstructing those vessels in the roots which convey nourishment to the plant. In such soils you may frequently, on minute examination, observe a yellow or orange-coloured calx of iron separated from the earth, and precipitated on the roots, which prevents the absorption of proper food. Soils containing metals which dissolve in water, should be avoided; but

but if a plantation has been actually made in such soils, the best method of preventing the Blight arising from this cause is to cut away the tap-roots which have struck into the under-soil, and encourage the increase of those which run horizontally. But the most important and beneficial precaution is to lay a good coat of manure upon the surface, as soon as the under-roots are taken off.

Water is most frequently the cause of Blight, particularly from land-springs, which should be carefully drained off, otherwise it were better never to plant at all. The best method is to let the drain run directly under the respective rows of trees; but be sure they be not small. The most completely planned orchard I ever saw has been totally ruined for want of this precaution, and a sufficient quantity of manure; and a tree, now one of the finest More-park apricots in this country, was planted seventeen years ago, by way of experiment, on the crown

of a large stone-arched cellar. These facts are well worthy of attention. Whenever the land is kept cold from under water, Fruit-trees can make no progress, and generally canker; also, where water remains stagnant for any length of time about the roots of trees, the tender fibres are chilled, and thereby destroyed. I am here only speaking of noxious waters; for pure water judiciously, frequently, and sparingly applied, is one of the best agents for keeping Fruit-trees in permanent health: first take all the proper precautions, then water, and the tree will probably not blight. This must, of course, be understood of good situations.

Heat, much oftener than cold, proves destructive to vegetation, by causing blight. I speak of the quick transition from heat to cold, for that does the mischief. Thus, what is called honey-dew, originates from heat checked by succeeding cold, which occasions the sap and saccharine juices to coagulate on the surface

surface of the leaves, and greatly injures the tree, by impeding its growth. But I have more fully considered the alternate succession from heat to cold in my last paper. See Vol. 17th.

Honey-dew is very detrimental to trees, by stopping the pores of the leaves. Old and decayed trees are much subject to this evil, from the sap running more to a saccharine juice.

Mr. Knight, and the Author of the Worcester Report, ascribe honey-dew to insects. Should it be insects, the fat of hogs, or rusty bacon, rubbed on the body of the tree, would disgust them, and prevent the mischief, and would also keep hares and rabbits from biting the bark.

Blight is also caused by extraneous vegetation, I mean moss or other vegetable productions, that are suffered to grow on the bark of fruit-trees: these prey upon the juices and nourishment of the plant; and, by preventing a proper

circulation of the sap, produce blight. This evil, if taken in time, is so easily removed by the brush and soap-suds, that I shall not enter further on the subject here, than to remark, that washing makes the stem and branches most delicately smooth and soft, if the practice be taken up from the first plantation of the tree.

Accidents, carelessness, and the suffering vermin to continue eating and fretting the tender bark, are very great causes of blight, often debilitating a large branch in a short time, and bringing on sure destruction to the tree. This is most effectually prevented by cutting and cleaning out the wounds, and using the medication as directed in the 11th volume, where there is a note on vermin. To avoid any of the causes above enumerated, examine the trees often, and remove all the

Impediments to Health,

as soon as they are perceived. Do not regard the time of the year, but stop every

every evil in the bud; and be assured that the knife does not injure the tree even in summer, and when it is full of leaves, for the growth is then so free that the wound only heals the better. Summer, indeed, is the best time for scoring trees, when the bark is too close for the tree to grow.

I shall now notice the last, but, by no means, the least of the causes of blight, which I have mentioned before, in the 17th volume of your Transactions, p. 274; I mean INSECTS, which are certainly the grand cause. I have there given it as my opinion, "that insects do not come over in the winds from the Continent, but are bred at home, from the eggs deposited about the tree in summer and autumn."

I am well convinced, that a minute observer will find this to be the fact; and, in confirmation of my opinion, I beg leave to lay before you three niduses or repositories for the eggs of insects: one of which contains 578 cells, another

650,

650, and a third 880; each nidus being formed upon, and adhering to a very small twig; the account of which is well authenticated, and leads to a consideration of the power of insects to do much mischief to infantine vegetation. I beg those Gentlemen who have patronized attempts to raise silk in this country, and have observed the production and nourishment of the Silk-worm, to consider the probable quantity of leaves and blossoms that are eaten by insects; reflect upon the quantity of vegetable matter required for the nourishment of 2108 insects, the number produced in these three niduses; and observe the small space they occupy, and how easily they escape notice. An engraving of two of these niduses, in their natural size, appears in *Plate VI. Fig.* 3.

For destroying insects, I cannot too strongly, or too often recommend the frequent and careful examination of Fruit-trees, and the gathering every nidus that

that may be found. The task is not so difficult to execute as it may at first appear, and should be undertaken early in the spring, before the buds expand; you may then destroy in a short time many receptacles of 500 to 700 insects, which cannot, at a more advanced age, be killed by fumigation, or collected by the hand, without infinite trouble. The niduses should be collected in a bag or box, and burnt; for if merely thrown upon the ground, the insects will still be produced.

The niduses are of various kinds; some adhere to the bark of trees, and contain an infinite number of small cells, in which the ova are deposited, as in the specimens I lay before you. Others are formed in small bags, or downy matter, of a substance resembling a spider's web; others in leaves, curled up with great care. It is in all these stages of their production that they should be discovered and destroyed; otherwise the same

warm

warm day that brings forward vegetation, hatches the insects, supplies them with food and shelter, and renders the evil difficult to be cured, though at a more early stage it might easily have been prevented.

As a proof that this operation is neither difficult nor tedious, it has actually been practised during three successive years, on four acres of a newly-planted Orchard, of which proof has been adduced before the Society. I would say to the public, 'Go thou and do likewise;' but the greater part of the trouble may be saved by proper cleaning in the preceding autumn.

Were it possible to contrive a regularly progressive flow of heat and cold, according to the will of the director, and regulated by the thermometer, Blight might actually be prevented. To prove this, I mentioned *the Hampton-Court Vine* in my paper inserted in the Transactions of the Society last year. This plant is kept

kept perfectly healthy and productive, merely through being regularly washed, pruned, cleaned, and protected from the external elements.

Let thus the attentive Orchardist see, foresee, and remove every evil in his power, and nature will do the rest.

These various modes of preventing Blight, according to circumstances, are confirmed by my own observations, during more than ten years of assiduous care and attention, and have approximated as nearly to the object as the nature of the case admitted. It is my wish the Society should be in possession of a regular series of principles on this important subject.

It is not easy to imagine how much benefit would result from what I call plantations of slips, shaws, and shelter, to protect the blossoms in spring, and the fruit in autumn. See *Plate VI.* To explain this, let four acres and a half be marked out for an orchard; then plant a slip of land, one pole

pole wide, with sweet chesnut Huntingdon willow, or any other free-growing wood, in six rows, extending along the three cold sides. If the ground be twenty-seven poles square, this slip would occupy half an acre, and if kept clean, the wood would more than pay its expence; whereas to build a wall to this extent, would require a thousand pounds, and not be so efficacious. In the Green Park, Westminster, is a plantation of horse-chesnuts, about eight years old, feathering down to the ground. Such trees would afford ample protection to a plantation so defended.

Let the shaws be properly raised, as before directed, to secure shelter and warmth to the plantation. Make the trees perfectly clean in autumn, and cover the ground, as far as the roots may be supposed to extend, with proper manure. Examine the buds as they swell; and, if strong easterly drying winds prevail in the spring of the year, then eject, with a garden

garden machine, two or three pails of water every morning, over the whole tops of the trees.

It may be said, that it is impossible to do this on an extensive plantation; but let me advise the experiment to be made on a few trees, and you will find the time to be well employed; and if there is a great return from the produce, you will be encouraged to persevere. One great objection may be the want of manure, as that, you may suppose, cannot be spared from the farm-yard dung. I can however suggest a method whereby you may constantly procure, for four acres of land, as much manure as is necessary for a term of twenty-one years, without expending six-pence. This will be explained under an account of an Experimental Orchard, or Fruit-Garden.

I am not ashamed to own, that I feel a pride in being able, so far, to have accomplished the improvement of standard fruit-trees, to some satisfaction. The principles

principles I have endeavoured to establish may be depended upon; but the practical part still remains very defective, and will depend on the energy and exertions of the country at large. I would particularly request gentlemen to consider the power of the new varieties. At a distance from towns, few persons are without one or more apple-trees; therefore let me beg that each may do something, for public happiness is but the result of that portion of general good, which arises from the exertions of individuals.

With the highest respect to the Society, for their regular attention to my observations, and attempts to perfect this valuable branch of Agriculture, which sheds upon mankind the blessings of Pomona,

I am, SIR,

Your most obedient servant,

T. S. D. BUCKNALL.

Hampton Court,
February 25, 1800.

Mr. CHARLES TAYLOR.

SIR,

THOUGH the time of the Sessions is over, permit me to add a few observations, and a further proof, that insects are deposited about Fruit-trees, and are a material cause of Blight.

A short time past, I requested Messrs. Kirks, Nurserymen, at Brompton, to look over their plantations, to procure me two or three niduses. I left a box, containing three, at the Society's Rooms, which was opened there by Mr. Thomas Taylor and myself, on the 14th of June last, upon which there issued from it swarms of animalcula, running out of the box, and over the desk and papers; many lay at the bottom of the box, and we supposed had died for want of food. When the active ones became sufficiently settled for us to form an opinion of their number, it was imagined they amounted to between 1500 and 2000. We had no

glasses to examine them; but they appeared to the naked eye, both in size and colour, like so many small fleas.

I must remark, that Messrs. Kirks, at my desire, have undertaken to keep a register of such apples of the new varieties as may come to their knowledge, to show the trees and their fruit to their customers, and to point out where the original, primogenious, or parent stocks were raised; with other circumstances necessary to form an opinion of the value and uses of such new varieties. I particularly request that gentlemen who may be so fortunate as to raise any, would be so obliging as to send four grafts to Messrs. Kirks, to enable them to supply a part of their plantations, assigned to these experiments.

I have herewith sent to the Society, a Ground-Plan of Mr. Lake's Orchard, situated at Woodstreet-Farm, in the parish of Bapchild, in Kent, and described

scribed at page 96 of this volume as the Orchard, *No.* 1: the trees are now sheltered by the hops, which are to be removed before the Fruit premium is to take place.

When the new hedge to the northward is fully grown, as high and thick as nature will carry it, the Orchard A, *No.* 1. *Plate VI. Fig.* 1. consisting of four acres, one rood, seven poles, will be particularly well screened from the cold winds; and, in my opinion, the small opening to the Orchard B, *No.* 1. containing one acre, three roods, six poles, to the south, will admit a sufficient degree of warmth, and a free circulation of air. The method I recommend for planting standard and dwarf Fruit-trees, is shown in *Plate VI. Fig.* 2.

I have used my best endeavours, through the Transactions of the Society, for the space of the last eleven years, to elucidate the business of Orcharding;

and it is my wish to render it as perfect as possible.

I have the honour to be,

SIR,

Your most obedient servant,

T. S. D. BUCKNALL.

Hampton-Court,
September 17, 1800.

Mr. CHARLES TAYLOR.

[The

[The *Plate VI.* to which the following DESCRIPTIONS apply, was presented to the Society by THOMAS SKIP DYOT BUCKNALL, Esq. M. P.]

DESCRIPTION *of Mr.* LAKE'S ORCHARDS, *noted as No.* 1, *situated at Bapchild, in Kent, for planting which he received a Premium of* THIRTY GUINEAS *from the Society; the particulars of which are mentioned at page* 96.

Plate VI. Fig. 1.—A, *No.* 1. is a ground plan of the Orchard, which contains the standard and dwarf apple-trees.

The standard-trees are planted 32½ feet asunder: two dwarf-trees are planted in rows between every standard; therefore forty-one standard trees and eighty-two dwarfs are planted upon each acre.

B, *No.* 1, is a ground plan of the Orchard, in which standard-trees only are

planted, containing forty-one trees per acre; the intermediate spaces being filled with hops.

C, D, E, F. Shaws or shelter, planted with Spanish-chesnut, ash, &c.

G. A plantation of chesnut-trees.

H. A new hedge of quick to the north, to be trained as high and thick as nature can carry it.

DESCRIPTION *of the Method recommended by Mr.* BUCKNALL, *for planting Standard and Dwarf Fruit-trees.*

Plate VI. Fig. 2. explains the manner in which the two dwarf-trees should be planted between each standard: the standard-trees to be 33 feet apart: every tree to be pruned in such a manner as to make each row to become, thirteen years hence, an actual hedge of fruit; the intermediate spaces to be filled with hops, which are to be displaced as the trees advance in growth.

DESCRIPTION

Mr. Bucknalls Method of planting Fruit Trees.

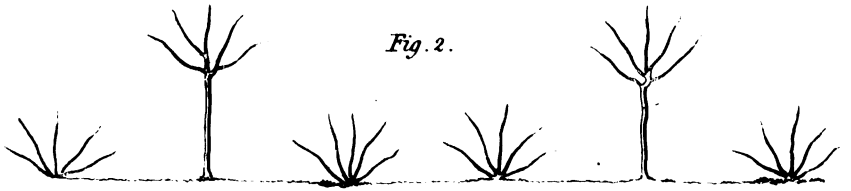


Fig. 2.

Mr. Lakes Orchard at Woodstreet.

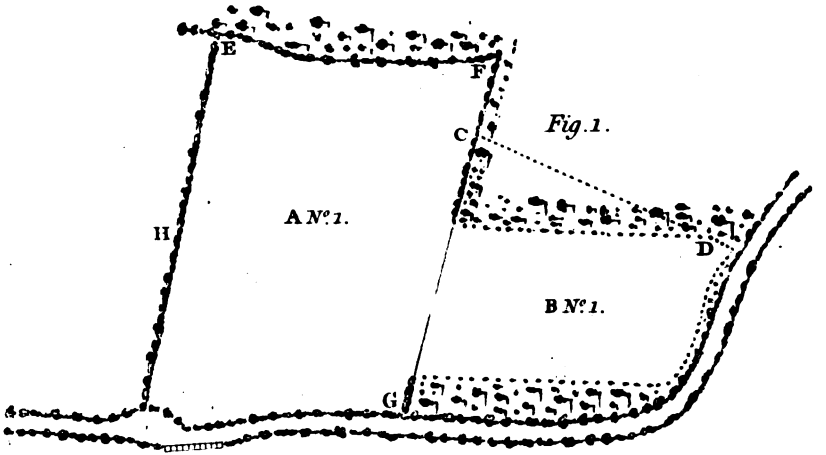


Fig. 1.

Niduses of Insects magnified.

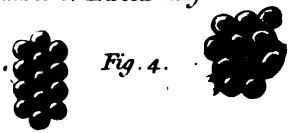


Fig. 4.

Niduses of Insects of their natural Size.

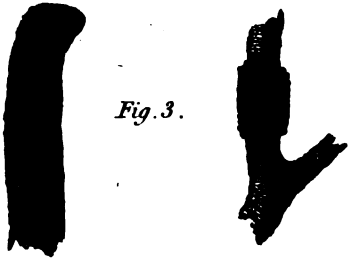


Fig. 3.

This Plate was presented to the Society of Arts &c. by T.S.D. Bucknall Esq.r

Lowry sculp.

DESCRIPTION *of some of the Niduses collected by Mr.* BUCKNALL.

Plate VI. Fig. 3. *a*, *b*, represent two of the niduses of their natural size, adhering to the twigs of trees on which they were formed: each of these contained about 700 insects. On the twig *a*, the nidus encircles the twig like a gold thread lapped round it; but the nidus on the twig *b* is on one side of it only.

Fig. IV. shows the cells in which the insects were deposited, as they appeared when magnified by a microscope.

The following Accounts of the Culture of the BEET PLANT, the application of its Leaves as Food for Cattle, of its Root for making Sugar, of its Sirup as yielding Melasses and ardent Spirit, and of its Residuum for other useful purposes, have been lately sent from Germany, along with a Sample of the Sugar, by Mr. JOHN TAYLOR, of Leipsig, to the Secretary, and by him communicated to the Society.

DEAR SIR,

IN compliance with your desire, I have taken some pains to examine into the merits of the various processes for preparing Sugar from the Beet-root, and to gain information upon the culture of the plant. You well know that Director Achard, of Berlin, first introduced this subject into general notice, and recommended

mended that the Sugar should be procured by boiling the Beet-roots, when taken out of the earth; that they be sliced when cold: that afterwards the saccharine juice be pressed out; that it be filtered, evaporated, and, after evaporation, the Sugar be procured by crystallization and pressure. That account having been printed in England, I shall not notice it further, but proceed to such other observations as have arisen from subsequent experiments.

The kinds of Beets which have been used for the preparation of Sugar from their roots, are varieties of that species called the Beta vulgaris, or Beta caule erecto of Linnæus, and of his Pentandria Dyginia class and order: they consist of the Beta rubra vulgaris, Beta rubra major, Beta rubra radici Rapæ, Beta lutea major, Beta pallide virens major, Beta alba vel pallescens quæ Cicla officinarum, and Beta communis viridis. Of these the principal are the Beta rubra

rubra vulgaris, runkel Rube of the Germans, or red Beet of the English, and the Beta Cicla, den weissen Mangold, of the Germans, or the white English Beet; and varieties of these whose roots have coloured rings.

Method of Culture of the BETA VULGARIS *of Linnæus;* RUNKEL RUBE, *of the Germans;* LA BETTE, *of the French; or* COMMON BEET, *of the English.*

THE soil should be a good black earth, not too moist; the land should be prepared as for cabbages, namely, dunged in autumn with short rotten dung, and ploughed; turned again in spring, and then ploughed a third time much deeper than before. The land on which (Kohl) white cabbage has been planted the preceding year, answers well for the culture of the Beet, such

such land having been generally kept clean from weeds, and well dunged. The seeds are usually placed from twelve to eighteen inches distant from each other, and one inch deep in the earth. The finger is used for the purpose, or an instrument resembling a bean-setter, with this difference, that the teeth are an inch long, and the above-mentioned distance from each other. In each hole one seed is laid, and immediately covered with earth. As the field where the Beet-root is sown is easily over-run with weeds, and the Beet-plants do not spring so soon as many of the weeds; therefore the ground must be weeded in four or five weeks time, and some weeks afterwards hoed: and since from one seed three or four plants frequently grow, or by negligence several seeds are sometimes thrown into one hole, therefore the extra plants must be drawn out to be placed where there are vacancies, and the weeds must be frequently destroyed. There is this advantage

vantage in sowing the seed in the method above mentioned, that the plants remain, and are not checked in their growth by change of situation. It is necessary, however, to pick out good and ripe seed, to prevent vacant places in the field.

Some prefer transplanting the roots to sowing the seed on the ground where the plants are intended to remain; and, in such case, make use of a stick to form the hole; the length of the stick determining the distance at which the plants should be placed from each other. After the plants have been some weeks in the ground, the earth should be loosened with a hoe, and the weeds destroyed.

The Red Beet is the kind which has been usually grown in the neighbourhood of Halberstadt; and the leaves of this, and the others, are eaten, when prepared, as spinach for the table; but are principally employed as herbage for cattle, who are fed therewith in the stalls.

The

The roots are pleasant food when boiled, sliced, and eaten cold, either alone or in sallads.

As the method which Professor Gottling has invented, to separate the sugar from Beet-roots, appears to me the most easy to be put in general practice, at little expence, and best calculated for Great Britain, I shall notice it more particularly.

He recommends the Beet-roots to be taken out of the ground about the middle of September, or from that time to the middle of October, in order to have good weather to dry them: they should be washed from their adhering earth, as speedily as possible, and their small fibres should at the same time be cut off; as likewise such part of the root as in growing had risen above the surface of the earth.

The roots are to be afterwards wiped with a cloth, and laid upon a dry floor; their heads are to be cut off and given

given to the cattle: the roots should be then sliced lengthways down the middle, each half again cut into thin slices, and loosely hung on strong thread upon nails, in an airy chamber or place secure from the rain. The slices should not be placed too near together, lest they spoil, nor too many be put upon one string, lest it should break; it is adviseable to turn the strings upside down, once or twice, to effectuate a speedy drying. In the course of ten or twelve days they become so dry that the strings may be removed nearer together, in order to allow fresh Beet-roots to be hung up, if there should be scarcity of room.

In the course of fourteen days, or three weeks, they will be sufficiently dry for their sugar to be extracted. In case there may not be sufficient room to dry them in the house, they may be dried in a barn, or any place secure from the rain. Instead of placing the sliced roots upon

upon strings, stages may be made in out-buildings, or any place secure from the rain. The sliced Beet-roots may be laid on netted frames within them, as in glue manufactories; but as children may be employed to string them, you may dry on strings a greater quantity of Beet-roots in a small compass.

If the drying season is far advanced, or a frost expected, the Beet-roots should not then be exposed to the outward air, but dried in the kitchen or warm rooms on strings, or netted frames, resembling the flakes used in Yorkshire for drying oat-cakes; as the roots become dry, they may be placed closer together. The slicing of the Beet-roots, properly forms the evening's occupation: no more should be sliced at once than can be strung or placed on frames to dry, as it is not adviseable to let the roots remain in slices long in a heap. The roots may be dried in stove-rooms by artificial heat; but great care is then required to keep

keep them free from smoak, or being burnt, otherwise the sugar will be dark-coloured, and of an unpleasant taste. It is better, therefore, not to dry the roots in stoves, unless in cases of necessity, such as where the frosts may prevent the roots from being dried in the open air.

The roots should be dried throughout, and not partially. If they appear grey on the outside, they should yet be inwardly white or red; and if chewed between the teeth, have an extremely sweet taste, free from must or acidity.

In large concerns, it would be best to slice the roots with machines contrived for the purpose: such as are used in England for slicing turnips, would do the business.

Where opportunity will not permit the Beet-roots to be sliced soon after being taken out of the earth, they should be placed in cellars, and covered with straw, or put into holes in dry sandy earth, and preserved

preserved till wanted, as potatoes are done in England.

In what degree the freezing, or longer preservation of the Beet-roots may affect their saccharine qualities, is not yet sufficiently ascertained. Some tria lsmade at Waltersdorf did not seem to occasion any material alteration.

When the Beet-roots are dry, they are ready for their sugar to be extracted: you must then provide three wood-tubs, wide, but not deep: oak, ash, or willow will answer; but fir, or resinous wood is not proper for the purpose: earthen mugs may serve for family use. If you employ wood vessels, there should be cocks or spiggots near the bottom of the tubs, and the tubs placed in a cool situation between eight and ten degrees of Reaumur's thermometer, or fifty-two degrees of Fahrenheit's, upon a stillage, near to each other; and so high from the ground, that smaller vessels may stand

below them, to receive the liquor when drawn off.

There should be good clear water near at hand, so as to be pumped into the higher vessels.

The Beet-roots having been dried, as above directed, must be sifted, to free them from the dust and loose fibres; then having half filled one of the higher tubs with clean roots, pour clear cold water thereon, to about one third in height above the roots: let them thus remain for three hours, stirring them at different times with a wooden paddle.

After the expiration of three hours, put into the second tub as many clean dried roots as had been placed in the first; draw the sweet liquor from the first tub into the vessel underneath, and pour it upon the roots in the second: then put into the first tub more fresh water, sufficient barely to cover the roots, and suffer the tubs to remain three hours more, stirring the roots repeatedly, as before.

The

The liquor which had been poured from the first to the second tub, will be now much absorbed by the roots in the second tub. After standing again for three hours, the sweet liquor from the second tub must be drawn off, which, if the roots were of the red and white ringly sort, will be of an agreeable red colour: it must now be run through a sieve, or filtered through a flannel, and should be fit for boiling down for sugar.

After this, draw the liquor from the first tub, pour it on the second, and pour on the first tub more fresh water, and let it stand three hours longer.

Then put into the third tub the usual quantity of dry roots, and pour thereon the liquor from the second tub: remove the liquor from the first tub to the second; and the roots in the first tub being now deprived of their saccharine matter, may be used for feeding hogs or cattle.

After three hours more, the liquor should be drawn from the third tub, by

filtering, as before, and may then be boiled down for sugar.

Then draw off the second vessel, and pour the liquor into the third; add fresh water to the second vessel, and let it remain three hours more, stirring the roots from time to time.

During this time, cleanse out the first tub, and add fresh roots, as before. In three hours time, draw the liquor from the third tub, and pour it upon the fresh roots in the first; then draw the liquor from the second tub, and pour it on the third: the roots of the second tub will be now exhausted and may be given to the cattle.

After three hours, draw off the liquor from the first tub, filter it, and it will be ready to boil down. On the contents of the first, pour the liquor of the third, and put fresh water in the third tub; let it remain therein three hours, stirring it as usual: during which time clean out the second tub, and give the roots to the cattle.

In

In the second tub fresh roots are again to be placed: proceed by extracting the saccharine matter, as before, and continue the operation, till all the ready dried roots have been thus freed from their sugar.

By this management the liquor becomes more charged with saccharine matter than you find the juice is when pressed out of the roots, and a considerable quantity of fuel is spared. The roots from which the liquor has been extracted will have swelled much in the operation, and have lost their sweetness: their farinaceous residuum will, however, afford good food for cattle.

It is not adviseable to have the vessels made too large for extracting the sugar, lest there should be too much liquor to boil down at the last. For the same reason, I think it better not to pour water the third time upon the last parcel of dried roots, but rather use them immediately for food for cattle, as they will not pay well for boiling down.

Whenever there is a sufficient quantity of dried roots ready, the process of extracting the saccharine liquor should be continued day and night, as it is not proper to let the liquor remain longer than three, or at most four hours, before you boil it, lest a dissolution of the mucilaginous particles of the roots should take place.

If it is not convenient to boil down all the saccharine liquor at once to a state of crystallization, yet it should be daily boiled down to the consistence of a sirup, to prevent its fermentation.

In boiling the liquor, take off the scum which arises.

On the Boiling, Crystallization, *&c. of the* Beet Sugars.

FIRST boil the extracted saccharine liquors down to the consistence of sirup; then put it into a copper, of which one third at least is empty, and let it boil away, by a moderate fire, until a vial which holds one ounce of water will contain eleven drachms of the sirup, or until the sirup pours somewhat broad from the ladle.

As the froth or scum arises, it must be carefully taken off. When the sirup is arrived at the point above mentioned, by gentle boiling, the fire must be removed from underneath the copper, and the sirup gradually run through a clean woollen cloth placed over a wooden or stone vessel.

The sirup must not cool too much before thus filtered, otherwise it becomes ropy; when the filtered sirup is somewhat cool, it should be laded into shallow wooden or stone vessels, to crystallize:

shallow earthen vessels, such as are used to produce cream, are proper for the purpose. Vessels made of tin will answer.

These vessels, filled with sirup, must be placed in a room heated from fifteen to eighteen degrees of Reaumur's thermometer, or sixty-eight of Fahrenheit's; and care must be taken to keep them clear from flies and dust.

If the sirup has been of a proper consistence, crystals will soon begin to form at the bottom of the vessels: and in the space of eighteen or twenty-one days the crystallization will be completed. The mass must then be put into a strong linen sack, well secured, and placed under a press to squeeze out the liquid from the sugar which remains in the bag; the liquid matter may be set to crystallize a second or third time, and will yield sugar of a coarser quality. A cheese press or long lever will serve for the purpose of pressure.

The

The sugar first obtained may be rendered purer by well mixing therewith a small quantity of clear spring water, and placing it again under the press; the coloured sirup will then run out, and leave the sugar in the bag in a much purer state than before: by repeating the operation, it is so far improved, that, when dried and rubbed, it becomes a fine white powder sugar.

The separated sirups should be again carefully boiled, and more sugar will be obtained from them by crystallization.

If the sugar procured by the first pressure be dissolved in as much clear water as will form a sirup, and placed again in a warm room to crystallize, it will yield a much purer and harder sugar; the sirup may then be separated without pressure from the sugar, merely by inclining the vessel, and allowing the sirup to run off from the crystals.

All the sirups prepared as above directed, are fit for family use, and are much

much superior in taste to those prepared from the pressure of the raw or boiled roots.

The remaining thick sirups may be used as treacle or molasses, and will serve to distill for rum or spirits.

The process above mentioned is so simple and easy, as to be within the reach of every farmer to accomplish; on which account I have entered more minutely into a detail of it. I shall now annex some other observations, principally drawn from the experiments of Professor Lampadius, of Freyberg, near Dresden, by which it appears that Beet-roots contain water, fibrous matter, sugar, mucilage, glair, starch, colouring matter, scented matter, and a bitter substance. The water is in the proportion of from one half to two thirds of the weight of the roots; the fibrous matter of the roots differs, and is considerably more in poor than rich land; the saccharine particles vary from two to five per

per cent.; the mucilage is from three to five per cent.; and the glair, or matter resembling white of egg, is about one per cent.; the starch is in very small quantity, being only about two or three ounces in a hundred weight: the colouring matter undergoes several changes by exposure to the air, as yellowish, brown, and red, and may be precipitated by acetite of lead: the scented matter is volatile; it rises in distillation of the root with water, combines closely with spirits of wine, and this matter occasions a peculiar contraction in the organs of taste. By boiling the Beet-roots the smell and taste are very much lessened. The bitter substance is soluble in water, and remains behind in the first sirup after the crystallization of the sugar.

The following are some experiments of Professor Lampadius.—One hundred and ten pounds of Beet-roots, the Beta cicla of Linnæus, or white English Beet, washed, peeled, cleaned, and then grated, gave

gave a mass which weighed eighty-seven pounds; out of which were pressed forty-one pounds and a half of juice, which was boiled with twenty ounces and a half of charcoal powder: this, when filtered and evaporated down until crystallized, produced full five pounds of a brownish yellow-grained sugar, also five ounces of brown sirup.

The above brown sugar, after being dissolved in six pounds of lime water, mixed with one pound of blood, then boiled, filtered, and afterwards evaporated, yielded four pounds five ounces and a half of purified brown sugar, and six ounces and a half of sirup.

The four pounds five ounces and a half of sugar thus prepared, were again dissolved in six pounds of lime water, mixed with one pound of milk, then boiled for a quarter of an hour: during the boiling, a small quantity of white wine vinegar, and a little more milk, were added; the

the saccharine matter was filtered, and treated as before; the product was four pounds of well-grained white powder sugar.

The residuum after pressure, the brown sirups of the two first processes, and the remains of the filtrations, weighed, when collected, forty pounds: they were mixed with one quart of yeast and eighty quarts of water, heated to 40 degrees of Reaumur's thermometer, or 112 of Fahrenheit's, and, after fermenting forty-eight hours, were distilled. They furnished, at the first distillation, fifteen quarts of weak spirit, which, on a second distillation, gave eight quarts of a better; from which, when rectified, were produced three quarts and a half of spirits resembling rum.

From the result of this series of experiments it appeared, that after paying the farmer for the roots, and discharging all incidental expences whatever, a profit

fit was yielded of nearly cent. per cent. on valuing the four pounds of white powder sugar at one shilling per pound, and the three quarts and a half of rum at one shilling per quart.

It is not to be inferred from these experiments, that the profit from this process will always equal the above; for subsequent experiments have proved that the crops of Beet-roots cannot always be depended upon, nor do they always yield the same quantity of sugar; the produce of different years having varied, from two pounds of sugar per hundred weight of roots, to five pounds, according to circumstances which have intervened.

However, I hope you will find the culture of the Beet-plant an object of consequence, on considering that its leaves afford nourishment for men and cattle; that its roots may be used as food, or to furnish sugar, one of the greatest

greatest luxuries of life; that, after the sugar is extracted, the roots are even then serviceable for cattle; and that the refuse-sirups will produce a wholesome spirit. In dry summers its herbage will be of great service to cattle, and does not give a bad taste to the milk; and in hard winters the roots are wholesome food. The Beta cicla is the Mangel Wurzel, or Root of Scarcity, of Dr. Lettsom, who has said much upon its use as food. Its advantages are now called forth to notice in other points of view, and deserve attention. In particular circumstances it may become a very useful article; time will determine its real merits.

The remarks I have here given you are very short, in comparison with the observations I have collected, which extend through every department of the business. If you want any further information, I will furnish it; but the above

above accounts appear to me sufficient to engage your present attention.

I remain,

DEAR SIR,

Your affectionate Son,

JOHN TAYLOR.

Leipsig,
May 20, 1800.

To Mr. CHARLES TAYLOR,

The

The following curious Account of the Method of FORWARDING VEGETATION BY MEANS OF STEAM, was communicated to the Secretary by his ingenious Friend THOMAS WAKEFIELD, Esq. of Northwich, and was presented to the Society by the Secretary.

The first Experiments were made in a Steam-house invented by Mr. Wakefield; the subsequent ones are copied from a Diary written by Mr. Butler, when Lord Derby's Gardener, and were made in a Steam-house built at Knowsley, by Lord Derby. All the Papers and the Drawings were received from Mr. Wakefield.

IN the year 1788, about the beginning of April, Mr. Wakefield being disappointed in several endeavours to procure Bark for a crop of melons in a Dutch

pit, twenty yards in length and three in breadth, thought he might contrive to heat it by Steam; and that, if he could succeed, he should ever after save the great trouble and expence of getting Bark in the neighbourhood of Liverpool. In a few hours, in the presence of two or three friends, he made a plan of the flues, arch, &c. according to the present method, and was then so confident of its succeeding, that he sent for workmen the next morning; and in a few days, under his direction, the pit was altered and fitted for the steam method.

From Mr. WAKEFIELD's DIARY.

EXPERIMENT I.

Commenced on the 25th of April, by putting some good melon-plants into three feet deep of strong melon soil. The plants grew very well, and were remarkably strong and luxuriant, but set no fruit till the 25th of July; they then produced

produced an abundant crop, excellent in flavour, thin-skinned, and thick-fleshed. It is now clearly proved, that their extreme luxuriance and backwardness in setting their fruit, was owing to the depth of the soil, as will be seen in the following year's experiments. It holds good in the fruiting of plants in general. Small pots will throw pines into fruit. Trees planted in deep soil, particularly pear-trees, are a long time before they fruit.

EXPERIMENT II.

1789.—Supposing that last year's soil was too rich, I planted this year in the same depth of a weaker soil, with a considerable addition of good clay marl, but less dung; thinking I should prevent, by this mean, the vigorous progress of the roots: but from the prodigious vegetating power attending this method, the plants grew equally luxuriant. Still they had no propensity to set their fruit until about the

same time of the year: the crop was again abundant and excellent. It was no uncommon thing for the fruit to grow in clusters of two and three, similar to walnuts; and universally each melon of the cluster ripened at the same time, and came to its full growth. Every thing is nearly the same as last year.

EXPERIMENT III.

1790.—As I now began to imagine that the depth of the soil occasioned the great luxuriance of the plants, I reduced it to two feet in depth. In consequence of this, the plants set sooner, but still late, and were too luxuriant. They produced, however, a most excellent crop, as well as in the former years.

EXPERIMENT IV.

1791.—Being now convinced of the necessity of not having the soil too deep, and wishing to ascertain the best depth, I filled the large pit with soil in such a manner

manner as to have a regular slope from end to end: the deepest part was two feet and a half, and the other one foot. The result was curious and interesting; for the fruit in the different lights set in regular succession, week after week, those plants fruiting first in the soil of one foot in depth. The crop was abundant; and on the deepest part of the soil, every thing was nearly as in the former years.

EXPERIMENT V.

1792.—This year the melon-plants were planted in fifteen inches of strong melon-soil, upon two feet of bark, that had been used two years before in the same pit, to prevent the steam from acting too powerfully on the soil, and to raise the plants near enough to the glass. All now succeeded well. The fruit set as well as on bark or dung, but was infinitely more luxuriant and productive.

During the last five years, the steam has been abundantly used in Mr. Wakefield's vine-house, with a success beyond his expectation. The first year the steam was used, the vines were much more luxuriant, and grew at least a month longer than formerly: to this circumstance the abundant crop of fruit the year following was in a great measure attributed, as it afforded time, after the fruit was gathered, for the embryo fruit to form in the buds for the ensuing year. Till now, it has been found difficult to furnish the plants with sufficient nutriment, both to ripen an abundant crop of fruit, and to swell the buds to that degree which is requisite to secure a good crop for the ensuing year. Through a want of this power, it frequently happens that vines, as well as other plants, seldom produce abundant crops for two successive years; but by the present method, Mr. Wakefield's vines have produced, for the last four years, fruit in the greatest abundance, and

and of the best quality; the grape-berries being much larger than formerly, thinner skinned, and better flavoured. But a sufficient proof that the vine delights in this atmosphere is this, that if steam be sufficiently supplied during the whole of the summer, the leaves every morning will be pearled round the edges with drops of water exuded from the plant. This is frequently seen in every house during the spring, when the earth and the atmosphere are charged with moisture, for then vegetation is in the most luxuriant state. But this indication of vigour is never seen at any other season in the old method; and from the want of it, the red spiders too frequently make their ravages, though, when steam is given in sufficient quantity, that destructive insect is never seen.

From Mr. BUTLER's DIARY.

A periodical Account of Experiments made in forcing esculent Vegetables by means of STEAM, *with their success, as practised in a house erected for that purpose at Knowsley*, 1792.

Sept. 13.—Laid the foundation of a steam-house, forty-two feet in length, and twenty-two feet in width; the back of which is in height fourteen feet, the front five feet six inches, and the surface contains nine hundred and twenty-four feet.

I have generally found, that in well-constructed pine-houses (if not very much exposed) one fire is allowed for every four hundred square feet; as less than this, in very cold weather, would be insufficient to maintain a proper degree of heat, without making the flue too hot, and thereby generating a destructive atmosphere. If a greater number of fires were

were allowed, they would probably, in unskilful hands, or when left in the night, over-heat the stove. My reason for the extra one hundred and twenty-four feet to two fires (the number this house contains), was either to prove to a certainty that less fire is required by using the Steam than in the old method, or to be practically convinced that the contrary is true.

Jan. 1, 1793.—Sowed some cucumber seed of the Southgate long prickly kind in a one-light frame, placed on a dung bed, not only to raise plants for the steam-house, but also to ridge out on dung, to be treated according to the Southgate method, being the most approved and expeditious method hitherto known of raising cucumbers. The bed being in fine order, the seed quickly vegetated, and grew very fast. They were also fit to stop, having thrown out two rough leaves by the time the house above mentioned was finished, which was the 1st of February.

EX-

EXPERIMENT I.

Feb. 1.—This day ridged out six holes or lights on a dung-bed, it having been in preparation three weeks, and put twenty holes in boxes in the steam-house, placing them on the dry flue, in the back of the house. Also planted some French beans in pots, and placed some roses, pink carnations, and hyacinths, in pots, on the kirbs and pit.

Success of Experiment 1.

Cut a handsome fruit on the 28th of February, being eight weeks and three days from sowing the seed, and four weeks from the plants being first brought into the steam-house.

Feb. 3, 1793.—Found that the cucumber plants standing on the flue did not answer. Placed some of them on a shelf close to the back wall, being two feet from the glass, and also placed others on the surface of the pit.

The

The quantity of water evaporated the last night was twelve gallons. Found that this was rather too much, the plants being very wet, and dropping from the glasses very fast. The mercury in Fahrenheit's thermometer was, in the morning at seven o'clock, 64 degrees. A similar thermometer, plunged into the old bark, rose to 100 degrees. This is a very kindly heat for tan.

Feb. 6, 1793.—The plants of cucumbers look exceeding well; those on the shelf and those on the bark keeping pace with each other. The runners push on with a vigour and regularity I never before witnessed. The leaves are unusually dark; and on the shelf some fruit are showing.

The French beans are appearing very uniformly through the soil.

The roses vegetate in a manner truly astonishing. It is usual to see them, in the common method, break only from one eye, which is generally that at the extremity,

extremity, while the rest remain dormant; but here every bud seems to be eager for the lead, and, as in a kindly showery May, promise a profusion of flowers. The pinks are beginning to spindle; the carnations not much; but the progress of the hyacinth is wonderful. Quantity of water evaporated, ten gallons. Night thermometer, 66 and 101 degrees.

Feb. 8.—Cucumbers still grow rapidly. Those in the frames look as well as they generally do, but are by no means equal to those in the house. The progress is by no means equal; those in the house, with steam, growing as much in twenty-four hours as those in the frames in forty-eight hours.

EXPERIMENT II.

Brought in this day one cherry-tree, one peach, one apple, and a vine-bud. The cherry, peach, and apple, were maiden, or one-year old, from the bud or graft the last February, viz. 1792, being

being a May-duke cherry, a Royal George peach, and a Nonsuch apple, in pots. These were placed on the kirb of the stove. The vine had made about three feet of wood the preceding summer, and nearly the size of a quill: I put it into a pot filled with one half rotten turf from a loamy soil, one third rotten cow's dung, the remainder sand; the pot was eighteen inches over, and twelve inches deep. At the same time I headed the vine down to two eyes.—Brought in a pot of myrtle, geranium, and jessamin cuttings, and plunged them into the old bark.—The roses, &c. grow very strong and rapidly.

Quantity of water evaporated, sixteen gallons, or thereabouts. Thermometer suspended in the house, 68 degrees.

Feb. 14, 1793.—On the 12th sowed some cucumber-seed in a pan, and plunged it into the bark. Cucumbers still astonish me with the progress which they make—shew plenty of fruit.—Brought some potatoes into the steam-house—

roses

roses show a great many buds—hyacinths and pinks come forward very fast—peach, cherry, and apple do the same—some cherry bloom ready to burst out.—I found the plants rather too wet this morning, so only gave nine gallons, or thereabouts, to be evaporated this night.

Feb. 16.—Every thing going on well—first cucumbers came into bloom. Thermometer 67 degrees.

Feb. 17.—Peach, cherry, and apple, in full bloom—every thing else going on well—cucumbers sowed the 12th finely up—those first brought in, show plenty of fruit-bloom.

Feb. 23.—Cherry-tree blossom falling off, being evidently too hot—about a dozen set, but are evidently in too confined an atmosphere, wanting more air than the other things in the house.—French beans remarkably vigorous—potatoes coming up very fine: roses and other flowers look remarkably vigorous, as also cucumbers. The peach and apple bloom

bloom looks very fine. The cucumbers, in common frames, do very well, but are much behind.

Water evaporated about ten gallons each night. Thermometer, from 66 to 70 degrees.

Feb. 28.—Cut first cucumber in steam-house, being seven inches long, having been twelve days in bloom, twenty-eight in the house, and fifty-nine from sowing the seed. Cherries all turn yellow, and drop off—apple bloom does the same—too hot for them.

Peach does pretty well—every thing else still astonishes me with the rapidity of its growth—leaves of French beans and cucumbers highly beautiful—look as though they were in their true element—some of them are fourteen inches long, and as black as a hat.

March 1.—Every thing growing with a rapidity truly wonderful.

Water evaporated eighteen gallons each night. Thermometer, 68 to 73 degrees.

March

March 5.—Cut cucumbers, some of them eight inches and a half long: those in the common frame look very well—show fruit, and have two set.

The peach-tree has a great quantity of fruit set on it, which look remarkably well, and are free from insects.

EXPERIMENT III.

March 8.—Brought a great quantity of pine-suckers of last year—having disrooted and plunged them into old dust of bark, being the small bark riddled out of the old stoves.

Cut eight cucumbers, some of which were ten inches long—hyacinths, narcissuses, and jonquils, in fine bloom.

March 10.—Gathered first French beans, being remarkably fine. The quantity of cucumbers, in their different stages of growth now on the vines, is almost incredible: the plants are vigorous beyond description. Indeed this is the case with every thing in the house. No insect yet appears;

appears; the thrip is not even on the French bean over the entrance of the dry flue.

Water evaporated, eighteen gallons per day.—Thermometer, 68, 70, and 73, by night; but by day 80, 90, and 100—when plunged into the bark, 105 constantly.—A fine heat—give a little air every day about ten o'clock, if the wind is not high, and there is no rain.

March 15.—Every thing succeeds, and answers my most sanguine expectations. Turned out a pine plant; find it has got a fine root quite to the outside: the pot pines look remarkably well—suffered less from losing their roots than in the common mode of treatment. Cucumbers sown in this house as fine as those raised on dung.

Cut first-fruit in the common frames, being fifteen days behind the steam. The plants have received no check, and look very fine: six weeks and one day have

elapsed from ridging out, and ten weeks and four days from the sowing the seed.

Water usually evaporated is about twenty gallons, if a fine night and dry with wind; but if wet and close, ten or twelve will be found sufficient for a house of this size.

March 18.—Find the bark growing too hot for the pines—raised them half the depth of the pots out of the tan.

March 20.—Every article before enumerated doing well; obliged however to give over much steam, as the bark, although small and solid, is heated to a greater degree than I ever knew any such substance to be heated. The quantity of cucumbers now cut from this house is astonishing; some to the length of eighteen inches.

March 25, 1793.—Heat in the bark still continues very violent, although the steam has been discontinued since the 20th. The peaches swell very fast—

pinks

pinks in fine flower—a fresh quantity of moss and common Provence roses brought into this house—the first removed into the peach-house—vine-bud advances very rapidly, and is remarkably strong. Thermometer, in the night, 69 and 70 degrees; in the day, 80, 90, and 95.

March 30.—Heat begins to decrease—the disuse of the steam visible in the countenances of the vegetables: cucumbers are however very prolific. Begin to steam again this night, leaving open all the apertures. On one plant count ten cucumbers swelling off. Plants in the frames very healthy; but cannot find any plant with more on it than four or five.

April 6.—Heat in the bark again begins to increase—poured cold water on it, between the pots of pines, and find it has a very good effect.

Cut, since March 30th, one hundred cucumbers, most of them very fine ones—

the plants very healthy—leaves larger than common—French beans, peach, vine, and flowers, do equally well. The cuttings of jasmine, geraniums, &c. strike with wonderful facility.

April 10.—Nothing can exceed the fecundity of the cucumbers, the rapidity of the growth of the vine, and swelling of the peaches.—Their health and perfect cleanliness from insects are admired by every one—indeed they exceed my most sanguine expectations. Nothing fails but the addition of potatoes, as was before mentioned, for which the air requisite for the other things is not proper; for they are drawn up very weak. Notwithstanding, I have found some potatoes in each pot; but they are not in their degree of heat.

April 20.—I still find that the source of the steam being under the pit, is a great evil, as I am obliged to use it less copiously than most of the things which the house contains require. The pines being

being plunged into the bed when the body of the bark is sufficiently heated, I am obliged to do without steam, as I cannot procure it, without adding heat to the bark.

To prevent this inconvenience, see the remarks made by Mr. Wakefield, in his subsequent Letter, dated Oct. 6, 1800.

For want of steam, the aphis and thrips are making their appearance, neither of which, I firmly believe, would ever have been here had the steam been continued. However, as the pines are now the prime object, since cucumbers, French beans, &c. may be obtained by any mode of forcing, I attend solely to the quantity of steam the pine requires, or to what the bark requires to keep it in a proper degree of heat. Peaches swelled very fine, and are likely to be soon ripe.—Removed them into the peach-house.

May 15.—I find that steaming once in three or four days, having watch sticks

in the bark to ascertain the degree of heat by, is sufficient. I have about three feet of old bark on the perforated arch, which is as firm as treading and five months settling can render it. If it was quite cold, I think it would require two days to bring it to a growing heat. After that, it will, as before said, require the steam and dry flue once in three or four, or perhaps not more than once in six days, to be used.—The quantity to be ascertained by the degree of heat required.

June 1793.—Pines continue to do pretty well; but I think if they were by themselves, and there were no cucumbers, &c. in the house, they might be managed better.—As soon as the steam is disused, the thrips and aphis insects appear, but quickly disappear on applying it again.

July. — Pines still grow very fine—cucumbers do not so well, as I cannot steam, for fear of hurting the pines, except when I am in want of heat in the bark,

bark, which may at any time be obtained in sufficient quantity when the steam is used.

August.—Having determined to use the steam-house only for forcing cucumbers, French beans, melons, &c. and not pines, I removed the young plants into their fruiting pots, and placed them in common stoves.

Sept. 2.—Having removed the young pines, the steam is now constantly employed.—Brought some young cucumber plants from a dung bed, and transplanted them into boxes placed over the back of the pit within two feet of the glass; still preserving those on the shelf at the back, though apparently going off.

Sept. 8.—Brought forty pines in fruit, and plunged them half way to the rim in the old bark, these being the same as were placed in the house in February.—Found it growing very hot by constantly using the steam.—The old cucumbers, at the bark, begin to assume a new appear-

lance, and put forth fine runners. Took two of the boxes from the shelf, and placed them on the bark lengthways of the pit.

Sept. 10.—The young plants sown August 21, are astonishingly fine; the old ones set on the bark are likewise very fine: but those on the bark-shelf appear not so likely to produce a lasting crop as young ones. I removed them, and placed some young ones in their room.—Found much less steam required than in the spring; and that twelve gallons were sufficient for two, and, if moist or rainy weather, for three nights.

Sept. 15.—Cucumbers continue to grow very rapidly—pines swell very well—and this day brought in some French beans.

Sept. 20.—Cucumbers grew very rapidly, as also French beans—pines swell very well—potatoes were planted this day in boxes five inches deep, and two feet wide, having been previously sprit.

Sept.

Sept. 25.—Every appearance indicates a very successful experiment of winter-forcing. Cucumbers show abundance of fruit. French beans and pines look very well.

Oct. 1, 1793.—Cucumbers look very strong, and are showing abundance of fruit. The leaves are remarkably large, and of a very deep black colour.—Found I had committed an error in stopping the apertures between the laps of glass with putty, as the steam does not pass off sufficiently quick.

Oct. 4.—Several fine fruit shows on the cucumbers, which look remarkably fine. Pines swell very fast, there being an amazing heat in the bark. Water evaporated, only six gallons last night.—Thermometer, 67 at night, and 80 degrees in the day; when plunged in the bark, 105 degrees.

Oct. 10.—Cucumbers continue very fine, and as luxuriant as ever I saw them; but do not show so much fruit as in the spring—some few are swelling, and one

is

is in great forwardness. Pines swell their fruit very fast. French beans are finer than I ever saw at this season of the year.

Oct. 22.—Cut a fine cucumber this day, being seven weeks and three days from the time of sowing seed; a great number swelling off. Pines and French beans still do well. Water evaporated, from six to ten gallons per night, according to the weather.

Nov. 1.—Cut some fine fruit this day from the cucumbers, and some pines that have a very good appearance.

Took the vine out of the pot, and placed it in a pit that had no fire, to harden the wood, having made a shoot from a very small plant, as before mentioned, of forty-two feet in length, thirty of which is fine firm ripe wood, with very round prominent eyes—not the least appearance of a root coming through the holes of the pot.

Nov.

Nov. 10.—I was very much disappointed this morning in finding that the flue under the arch had burst, and that there had been much smoke and sulphur in the house all night. The destruction this had occasioned among the plants in the house was great. The French beans, and all the young fruit and tender branches of the plants, were totally destroyed. This misfortune happened through the negligence of a bricklayer in not cleansing the flues.

Nov. 20.—After the misfortune that happened on the 10th instant, I conceived that nothing more was to be expected from the cucumbers. I immediately had the flues cleaned; and having continued the steam ever since, I found that they were breaking out fresh and strong, and showing abundance of fruit. Had the plants received such a shock in a frame, I am certain that they could not have been so quickly brought about by any method, and I much doubt whether it would

would have been possible to effect it at all.

Nov. 25.—The cucumbers are doing well, beyond any conception I had formed, after experiencing the last misfortune. French beans are tolerably good; but I find that want of light is the only mischief which we have naturally to encounter.

Sowed some cucumber-seed in a pan, and placed it in the steam-house.

Dec. 1.—Cucumber plants sown the first are up, and look very well—the old ones show abundance of fruit, but do not swell them off freely.

At the time of erecting this house, I conceived that it was necessary to have it as air-tight as possible; and therefore I stopped every crevice, and laid putty between every square at the lap. I think it would have been better, had they been left open, and am now taking away the putty.

Dec.

Dec. 24.—Since the first instant I have experienced, that to stop the apertures between the squares with putty is an error; for, since I have removed it, the plants which before were always too wet, are now easily dried by using the dry flue, even in dark wet weather. The fruit on these plants swells more freely, and the young plants look very well.

Brought in this day some hyacinths, roses, carnation, pink, and syringa roots. The weather being dark, used but little water, ten gallons per evening being the mean quantity. If windy, more, if rainy, less is required. The plants should just be tipped on the edges in a morning, similar to the vegetables in a summer morning which has been preceded by a showery day. No certain rule can be laid down how a knowledge may be obtained of the quantity of water requisite to gain this desirable criterion of good management. An attentive observer will soon be able, by the appearance of the atmosphere, to

to judge the quantity requisite, both of heat and moisture.—And here I would wish to give it as my opinion, that nature does not act by rules in rearing her tender saplings, but often changes her mode of treatment, from one extreme to another, in the space of twenty-four hours: I do not mean to say, that plants raised by art are as capable of sustaining such rude shocks as those left to nature; but this I believe, that more are killed by kindness than by bold management, both in the animal and vegetable world; from whence I infer, that a few degrees of difference in heat, or a few gallons of water, will not be productive of any bad consequence.

Nov. 29.—Stormy day—admitted a little air by propping up the bottom lights with a stone. The weather being windy, kept the holes open for the steam the greater part of the day. Cucumbers look very well—pines swell very fast. My foreman says that the Black Jamaica has

has swelled half a pound since it was first brought here.

Water used last night and to-day, ten gallons. Thermometer, 68 degrees at night—plunged into the bark, 101 degrees.

Dec. 6.—The season is at present as unfavourable for forcing as possible; and the steam has not been used so much as if the weather had been dry and windy. Every thing looks tolerably well, and some cucumbers swell as freely as any I ever saw. French beans grow better than I ever saw at this season; and a few pines swell very well. However, I have no doubt, if the weather was not quite so wet, and I could use the steam more copiously, but that I should be better satisfied.

1795. *Jan.* 6.—Cut this day, from the steam-house, seven as fine cucumbers as I ever saw in the month of May. The weather being frosty and clear, the steam is now used to great advantage.

tage. Fruit, that during the dark weather looked bright and well, but remained suspended as soon as the atmosphere became clear, and the sun burst forth, swelled away with a rapidity scarcely to be credited. The French beans are growing equally well. Pines swell very fast, and the cuttings of the Hydrangeum Hortensium, and Rosea semper flora, strike with great facility.

Thermometer, suspended in the house, 68 degrees in the night—plunged into the bark, 100 degrees Nairne. In the open air, 26 degrees 6 minutes below freezing.

Jan. 13.—Cut nine fine cucumbers, and gathered a quantity of fine French beans. The weather still frosty, and consequently clear. Pines swell very fast. Thermometer, suspended in the house, 70 degrees, Fahrenheit's scale; 100, plunged into the old bark; 20 in the open air; and 12 below the freezing point.

Water

Water evaporated, about twenty gallons per night, much more being requisite in frosty than in mild weather. Quantity of coals burned, during the last twenty-four hours, three baskets, which are nearly equal to four bushels.

Jan. 20.—Cut this day thirteen cucumbers, and gathered a fine dish of French beans. Every thing is in as flourishing a condition as it is possible to conceive. Pines swell very fast. Thermometer remained, during the night, at 61 degrees. Sharp frost.—Thermometer, in the open air, 19 degrees 18 minutes, being 13 or 14 degrees below freezing.

Water evaporated, twenty gallons during the night, viz. from three o'clock P. M. until seven o'clock A. M.

Jan. 22.—Though the thermometer has been in the open air the last night, at 16 degrees, being 16 degrees below the freezing point, yet the plants in this house look as well as ever, the cucumbers having swelled their fruit as freely, or

more so, than when the thermometer stood at 36 or 40 degrees.

Jan. 24.—Though yesterday and this day have been cloudy, and attended with some snow, (the thermometer in the open air being at 25 degrees Fahrenheit) yet every thing flourishes admirably. The cucumbers are as fine as they can be conceived to be, growing very strait and rapidly. Three days since, I cut all that I could obtain; yet I measured one this day, and found it to be nine inches, which, on Tuesday the 20th instant, was only six inches in length. There is a beautiful bloom on it, and such as appears on those growing in dung in April, when the bed is in a fine growing state.

The young plants exceed those in the frames in the ratio of two to one. Some French beans planted in the common stove, at the same time as the plants were in this department, are not to be compared with them, as the plants are now in fruit, while the French beans, though

though they look very well, are not in bloom: the roses are blooming very finely.

Water evaporated last night, fourteen gallons. Thermometer, 70 degrees.

Jan. 26.—Cut this day seven brace of cucumbers, as fine as any I ever saw cut in April from dung-beds. I likewise cut some French beans. Pines swell very well; one that showed its fruit in 1794, and was then brought into this department, is now changing colour. The one that showed fruit in November, is swelling very fast. Thermometer, 70 degrees; in the open air, 44 degrees thawing.

Water used, twenty gallons in twenty-four hours.

Jan. 30.—The frost which is again set in, was last night remarkably severe; the thermometer being at 15½ degrees. Yet nothing can exceed the beauty and healthful appearance of every thing in this house. It has been the opinion of some experienced in horticulture, that it would be impossible to do any good with

steam in very severe frosss; but I always entertained a different opinion, and am highly gratified to find that I was not mistaken. It is now nearly two years since I first began to try experiments with steam; and one circumstance only excepted, viz. the accident of the flue's bursting, in November, 1793, I have uniformly found every thing in this department always clean, healthy, and vigorous, beyond any instance I have ever witnessed; and I have no doubt, should I live two years longer, of being still a witness of its wonderful efficacy in assisting vegetation, and of being enabled, during the spring and summer months, to bring every species of fruit to perfection, without the danger of being disappointed through insects, the natural consequence of a dry heat.

Feb. 3.—Laid a foot thick of rich soil on one half of the pit in this department, in order to turn some pine plants that are just showing their fruit into it, out of their pots.

Cut

Cut this day seven brace of very fine cucumbers, a quantity of fine French beans, and a very fine pine, which has never been in any place since it was in bloom but this house; and no bark has been brought in here since February, 1793.

Young cucumber-plants sown in December, 1794, are growing very fast, though the weather is very much against forcing. Last night there was a heavy fall of snow. Thermometer, in the open air, 24; in the steam-house, 70 degrees.

Feb. 9.—Cut this day thirteen cucumbers, and a great quantity of French beans from the steam-house; every thing being in a flourishing state. The earth that was brought into this department on the 3d instant, and laid on the bark, fourteen inches thick, and only half the breadth of the pit, is this day of a fine temperate warmth. Water evaporated, twenty-six gallons last night, being windy. Thermometer, in the open air, 38 degrees.

Feb. 10.—Turned sixty-six pine plants out of their pots, and planted them in the soil over the steam without any bark, the soil being of a fine temperate heat.

Feb. 16.—Cut this day five brace of cucumbers off the plants in this house.

Pines that were turned out of the pots look extremely well, as also does every thing in this house. Water used, twenty-four gallons during the night.

Feb. 23.—Cut this day six and a half brace of cucumbers, and a great quantity of French beans. Cucumbers are amazingly vigorous. Pine plants that were turned out of the pots look extremely well. Water as before.

March 2.—Notwithstanding the weather is very unfavourable to forcing, every thing looks well in this department. Cut this day six brace of cucumbers, and plenty of French beans. The pines look extremely well, and I have this day brought in the miraculous vine, to

to see if it will effect any thing this season. Turned some plants of cucumbers out of small pots into tubs, there being one fruit on one of the pots. Water evaporated, twenty to twenty-four gallons. Thermometer, 73 in the night, and 80 degrees in the day; when suspended in the open air, 30 to 33 degrees.

March 9.—The weather is still as unfavourable as I ever knew it to be, so that it is with great difficulty that I can look into a frame; which makes a steam-house a very desirable thing, as, through this, necessary attendance may be paid to those vegetables that require it in any weather. Cucumbers are still fine. Cut this day the usual quantity. The pines growing without pots or bark look extremely well.

March 16, 1794.—I never remember such a season as this. So much snow, and so little sun, in March, are very uncommon. In some places the snow is two feet in thickness. I think I could

not have had a more unfavourable season for experiments. However the different kinds of plants in this house look very well. Cut this day thirteen cucumbers, and a great quantity of French beans. The pines have a good appearance, and the vine is breaking that bore the miraculous crop last year, and in the same pot, in a manner that is truly astonishing.

Water used, twenty gallons in the night. Thermometer 65 degrees in the night, and 70 degrees in the day; in the open air, 28 to 36 degrees.

Description *of the* Steam-House *invented by Mr.* Wakefield.

Fig. 1. THE ground-plan, showing the direction of the flues, upon two of which, A B, are placed flat copper pans, extending from C to D, three inches in depth, and made of thin rolled copper. These pans are fixed in the brick work, and supported by flat iron bars underneath; are inclosed in the steam vaults E, represented in the section of the house, *Fig.* 2; and steam is formed from water poured within them.

The roof of the vault F is a perforated brick arch. See *Fig.* 5, admitting the steam through the tan or soil G G, which is placed upon the arch, after it is covered with small slates or tiles, to prevent the tan or soil, in which the plants grow or are plunged, from trickling through the said arch.

The width of the soil-bed or pit is six feet; the depth of the steam-vault, E,

is

is four feet, from the bottom of the flue to the center of the arch; and the inside width of each of the flues A B, is fifteen inches. The height, from their bottom to the underside of the copper pans, is twenty inches. Each of these flues has a furnace H H, at the opposite ends of the house, and the smoke passes on through the back flues I.

There must be a separate furnace K, for the front flue L M, which flue is within the steam-house, and more elevated than the arch F. Upon this flue is placed a flat copper pan, similar to those already described; this pan extending from L to M, is used occasionally with or without water therein, as may be found suitable to the purposes explained in Mr. Wakefield's subsequent letter.

At N is a leaden-pipe to convey the water into the back pans below the arch: the other pans below are supplied in a similar manner. At O there are square holes, which must be left the whole

whole length of the building, to allow steam to mix plentifully with the atmosphere in the house.

Fig. 2. is a section of the steam-house: for references to the letters, see the accounts above.

Fig. 3. shows the form of one of the copper pans, upon a larger scale. P is the bottom of the pan; Q, the edges placed within the brick work.

Fig. 4. is a section of the pan and flue, to show the manner it is fixed in the brick-work, and the depth of the flue.

Fig. 5. is an upper view of the arch, to show the perforations therein previous to their being covered with tiles.

DEAR SIR,

IN answer to your enquiries I inform you, that it is better to have a long copper pan upon each flue, than several small ones. Mr. Butler's pan was made of iron; but copper pans are superior for the purpose.

The Duke of Bridgewater has lately built a steam-house on the present plan, which answers his expectations. I cannot say whether Lord Derby's steam-house is now used or not, as Mr. Butler has left Knowsley, and I have not been there since.

You will observe in Mr. Butler's experiments, that the bark was sometimes so heated by the steam below, as to render the continuance of it in that direction improper; therefore a copper steam-pan has since been placed over the front flue of the stove, and extending the whole length of the front, from

L to M, *Fig.* 1. This copper pan is covered with perforated tiles, similar to those used in drying malt, which afford the opportunity of pots of French beans being placed thereon. This situation is peculiarly favourable to these plants; and, at the same time, permits a sufficient quantity of steam for other plants in the house to ascend through the tiles, from the water heated in the copper pan beneath them.

Where there is no front flue in a vine-house, it will be found very serviceable to fix a flat iron boiler, at the back of the vine-house, in such a manner that the steam may pass from it by pipes through the wall from an arch or cover made over the boiler.

It is necessary, in the construction of all steam-houses, to be particularly careful that the flues for the smoke be sound and perfect, as nothing is more injurious to vegetation than smoke pervading the

the house from holes or fissures in the flues.

I remain,

DEAR SIR,

Yours sincerely,

THOMAS WAKEFIELD.

Northwich,
October 6, 1800.

To CHARLES TAYLOR, Esq.

REWARDS

Plan of Mr. Wakefield's Steam House.

Fig. 2.

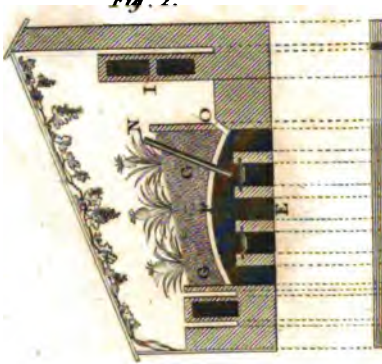


Fig. 1.

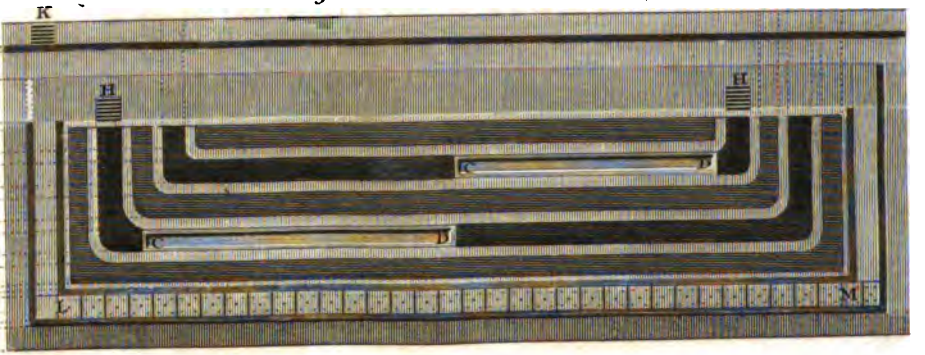


Fig. 4.

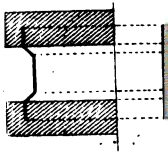


Fig. 3.

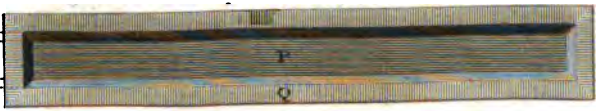


Fig. 5.

Lowry sculp

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BESTOWED BY THE

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From October, 1799,

To June, 1800.

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BESTOWED IN

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Class 34. To THOMAS JOHNES, Esq. M. P. of Hafod, for having planted four hundred thousand Larch-trees, between the 24th of June, 1796, and the 24th of June, 1797, the GOLD MEDAL. See page 81.

Class 68. To the Reverend WILLIAM SMITH, M. A. of Craike, for having planted eleven and a half acres of land with Forest-trees, the GOLD MEDAL. See page 84.

Class 74. To JOHN LAKE, Esq. of Radfield, for planting six acres of land with Apple-trees, THIRTY GUINEAS. See page 96.

Class 88. To JOHN CARTWRIGHT, Esq. of Brothertoft Farm, for having planted sixty acres with Beans and Wheat, TWENTY GUINEAS. See page 180.

Class 97. To Mr. THOMAS JONES, of Fish-Street Hill, London, for cultivating four thousand and fifty-three plants of the true Rhubarb, THIRTY GUINEAS. See page 117.

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IN CHEMISTRY.

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IN POLITE ARTS.

Class 192. To Miss ELIZA BARRETT, of Stockwell, for a varnished Drawing of a Landscape, the GOLD MEDAL.

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IN MECHANICKS.

Class 223. To the Widow and Children of the late Mr. RICHARD BOWES, of Conway, in North Wales, for Specimens of Mill-stones, and accounts of a Quarry thereof, near Conway, ONE HUN-

DRED POUNDS. See page 197.

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Class 224. To Mr. S. HOLMES, of Castle-Court, Strand, for a cheap and useful Family Oven, FIFTEEN GUINEAS. See page 224.

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